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American Journal of VETERINARY MEDICINE

Vol. XIII MAY, 1918 No. 5

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Efficacy of Some Anthelmintics*

By MAURICE C. HALL and WINTHROP D. FOSTER, Washington, D. C.,
Zoological Division, Bureau of Animal Industry, Department of Agriculture.

ALTHOUGH the use of anthelmintic treatment is an old practice in human and veterinary medicine, the efficacy of the various substances employed as anthelmintics is not well known. What information is available is based largely on clinical observations, efficacy being judged to a large extent on a consideration of the improvement or lack of improvement in the patient's health after treatment. In other instances the efficacy of the treatment has been checked by fecal examinations for worms passed and for eggs persisting in the feces; but, while this method gives real and valuable information, it is somewhat inexact. The methods employed for examining feces for worms passed are often rather casual; and negative findings in examining feces for eggs, especially when a small number of preparations are examined for only a few days after treatment, are not always conclusive.

A more satisfactory method of investigating anthelmintic efficacy is to administer treatment to animals, to collect all feces passed for a number of days, to recover from them all worms present, and then to kill the animals and collect all worms remaining. In this way it is possible to arrive at a fair idea of the anthelmintic effect to be expected from a drug, the correctness of the conclusions depending, of course, on the number of experimental animals used and their degree of infestation.

While it is thus possible to express the efficacy of a drug in the form of a mathematical ratio, the writers are fully aware that such ratios, except when based on extensive data, can not be considered an accurate index of the efficacy of the drug, since many factors, not entirely within control, such as the individual reaction of the animal, the amount of material in the alimentary tract, and the potency of the drug, all enter into the problem.

In carrying out this series of experiments the plan of the writers was to test as many drugs as possible having a known or alleged anthelmintic value, abandoning those which gave no results, and making further experiments with the more promising. It is therefore possible that some of the drugs tested only once and on a limited number of animals may have more anthelmintic value than the tests indicate. On account of the extent of the field to be covered, the writers did not feel

*Abstract from the Jour. Agric. Research, Wash., D. C., 1918, xii, 397.

justified in devoting more effort to those drugs which gave small promise of success.

Some such method as the above has been employed by previous investigators. Hutcheon (1891) made numerous tests of anthelmintic treatments for stomach worms in sheep and goats in South Africa, and followed the treatments by postmortem examinations to determine the immediate effect on the worms. Stiles (1901, 1902) did similar work in this country, and a number of veterinarians and stockmen have made investigations involving treatment, postmortem examination, and clinical observation. But, so far as the writers are aware, a detailed series of experiments covering the treatment of animals and the collection of all worms from the feces for a number of days up to the time of making a postmortem examination in which all worms remaining were collected, has not been reported.

In this work the following method was pursued: The animals were given an appropriate dose of the anthelmintic to be tested, the method of dosage varying with the purpose of the experiment and the substance to be tested, preliminary purgation being undertaken or omitted as desired. Treatment was usually administered in the morning, and all feces were collected every morning thereafter until the animal was killed. The feces were washed through a set of graded screens and the screens examined for worms. The animal was usually killed the morning of the fourth day after the administration of the last dose of the anthelmintic, and all parasites remaining were collected and counted.[1] The percentage of efficacy was then estimated from the number of worms found on postmortem examination and that number plus the number passed after treatment. When preliminary purgation was resorted to, the feces were collected on the following day, the day of administering the anthelmintic, to ascertain what worms if any were removed by simple purgation.

For convenience we have arranged our experimental data in three groups: (1) Simple purgatives, (2) a group including anthelmintic showing a mineral base and coal-tar products, and (3) a group covering the vegetable anthelmintics.

Calomel

Dogs.—Four infested pups weighing 3.6 to 4.5 kgm. were fasted from noon of the day before treatment, given 4 to 5 gm. of calomel, and on the day following treatment given 15 mils of castor oil.

Conclusions: The treatment was inefficacious.

Castor Oil

Dogs.—In 11 experiments in which castor oil was used as a preliminary purge on 50 dogs it removed 27 *B. marginata* out of total of 351. Its effect on hookworms *(Ancylostoma caninum)* and whipworms *(Trichuris depressiuscula)* was practically nil.

Conclusion: It has little to recommend it as an anthelmintic.

Epsom Salt

Dogs.—Three dogs were given the salt in molasses at the rate of 4 gm. to each 5 kilos of weight. It had no effect on ascarids (*Belascaris marginata*), hookworms (*Ancylostoma caninum*), whipworms (*Trichuris depressiuscula*), *Dipyidium caninum*, or *Taenia pisiformis*, all of which were found present at postmortem examination.

Conclusion: Epsom salt is less effective in dogs than other purgatives, such as castor oil or calomel, and is not particularly useful in canine practice.

Hogs.—Two pigs, weighing about 23 kgm. (50 pounds) each, were kept in separate pens on board floors and deprived of both food and water for 24 hours. Each pig was then given 226.8 gm. (8 ounces) of Epsom salt dissolved in about 3.8 liters (1 gallon) of water and placed in the drinking troughs. The pigs took a few swallows of the water and refused to taste more, showing their resentment by overturning the troughs and spilling the contents.

[1] In conducting these experiments the writers occasionally found on post-mortem examination dead worms in the large intestine or rectum which normally are found in the small intestine. In such cases, as the worms were evidently in the process of passing out, they are credited as being removed by the anthelmintic.

Conclusion: Repeated experiments proved that a solution of Epsom salt, even when less than 2 per cent in strength, is so distasteful to pigs that they will not drink it even after a relatively long period of thirst.

Tartar Emetic

Hogs.—Tartar emetic is commonly used as a remedy for roundworms in horses, and this led the writers to test its effects upon worms in hogs. Two small pigs, weighing 8.6 and 14.5 kgm., were each given 259 mgm. of tartar emetic dissolved in water, followed after a short interval with 29.57 mils of castor oil.

Conclusion: Tartar emetic has an anthelmintic action on worms in swine, but further trials will be necessary before conclusions can be drawn as to its efficacy. The method of administration used in the experiments is not likely to prove suitable in practice.

Chloroform

Dogs.—Five dogs, weighing from 5.5 to 17.7 kgm., were given, in the morning after fasting from the evening of the day before, 0.2 mil of chloroform per kilo of body weight mixed with 3 mils of castor oil per kilo of body weight. All of the dogs were infested with hookworms, four very lightly, one heavily, three had a few ascarids, four a few (1 to 27) whipworms, two a few tapeworms, and one numerous (250) tapeworms of the same species.

Conclusion: Chloroform and castor oil proved rather highly efficacious in removing hookworms, removing all in three cases of light infestation, failed to remove any in one case, and removed over half of the parasites in a case of heavy infestation. The results in the case of ascarids and whipworms are not striking.

A further test of chloroform in combination with other drugs as an anthelmintic for hookworms in dogs was made with the remedy in the form of Hermann's mixture:

Oleoresin of male-fern	4 gm., or
Oil of eucalyptus	2 gm.
Chloroform	3 gm.
Castor oil	40 gm.

After a fast of 24 hours, two dogs weighing 9.5 and 16.5 kgm., respectively, were given the full dose of Hermann's mixture. Two other dogs weighing 9.6 and 12.4 kgm., respectively, were given the mixture without chloroform.

Conclusion: It appears that Hermann's mixture (including both eucalyptol and male-fern) is an efficient vermifuge for hookworms, owing largely, if not entirely, to the chlorofrom content. It is also efficacious for *Dipylidium caninum,* probably on account of the male fern it contains. It seemed to have some slight effect on whipworms, but the evidence of this was by no means convincing. The combination of male-fern and castor oil seemed to have no deleterious effect on the experiment animals, in this respect supporting the opinion of Lenhartz (1902) and Seifert (1908). Further experimentation, however, is desirable to elucidate this point.

Sheep.—Chloroform was given to two sheep, weighing 25 and 28 kgm., respectively. The dose for each was mixed with 60 mils of castor oil, the smaller sheep receiving 5 mils of chloroform (0.2 mil per kilo) and the other 10 mils (nearly 0.4 mil per kilo). Both sheep died four days after dosing and showed, on postmortem examination, lesions of gastro enteritis and pneumonia in the congestive stage. The sheep were very lightly infested with parasites.

Conclusion: The results indicate that chlorofrom is not a promising anthelmintic for use on sheep.

Ether

Dogs.—Four dogs weighing 2.38 to 4.89 kgm. were given ether in a dose of 0.8 mil per kilo mixed with 15 mils of castor oil for the two smaller dogs and 30 mils of castor oil for the two larger dogs. The afternoon of the day before treatment the dogs were given a preliminary dose of castor oil, and were not fed until several hours after receiving the ether. No worms were recovered from the feces passed between the administration of the preliminary dose of castor oil and the administration of the ether and oil mixture. This mixture was much resented by the dogs, and all of them were salivated by it and showed more or less evidence of collapse.

Conclusion: The ether exhibited a rather slight anthelmintic action against ascarids, no evident action against hook-

worms, and probably was instrumental in the removal of a tapeworm which was presumably present in one of the dogs, in view of the discovery of segments in the feces.

Iodoform

Dogs.—Among the remedies prescribed for ascarids in human subjects iodoform has been occasionally recommended. It was intended to give the maximum amount, 0.18 gm., in one dose to each of four dogs ranging in weight from 11.8 to 14 kgm. However, through an error in weighing the drug, the dogs were each given 0.018 gm. instead of 0.18 gm. This error was discovered afterward, and the next day the full dose, 0.18 gm., was given. Thus, each dog received a total of about 0.2 gm. of iodoform, given in capsule with sodium bicarbonate. The dogs were starved for 24 hours before treatment, and allowed one meal between the first and second doses. After each dose 29.6 mils of castor oil were administered.

Conclusion: As far as can be judged from a single experiment, iodoform is valueless as an anthelmintic for intestinal parasites in dogs, even when given in doses in excess of that prescribed for human subjects.

Copper Sulphate

Sheep.—Five sheep less than a year old were dosed with copper sulphate, two receiving 0.5 gm. each of powdered copper sulphate in capsule, and three receiving 50 mils each of the 1 per cent solution.

Conclusion: Evidently the powdered copper sulphate in capsule exhibited no anthelmintic action. On the other hand, supporting the experience of Hutcheon, Stiles, and others, a 1 per cent copper-sulphate solution in 50-mil doses proved very efficacious in the removal of stomach worms. It had no evident effect upon other intestinal parasites.

Dogs.—In view of the efficacy of copper sulphate against stomach worms in sheep, an attempt was made to determine whether the well-known emetic action of this drug would entirely prevent its use as an anthelmintic for dogs. Four dogs were each given 0.5 gm. of copper sulphate dissolved in 10, 20, 30, and 40 mils, respectively, of water, and 2½ hours later they were given 14.79 to 29.57 mils of castor oil each.

Conclusion: It is obvious that the emetic action of copper sulphate precludes its use as an anthelmintic for dogs.

Gasoline

Sheep.—Gasoline has been extensively used as a treatment for stomach worms, but some authorities consider that there are dangers attending its use.

Gasoline is usually given in milk, linseed oil, or flaxseed tea, which makes the treatment considerably more expensive, and, as these feeds are not always available in large quantity, the treatment is not well adapted to the needs of large flocks.

Four lambs were treated, two weighing 21.09 and 21.77 kgm., respectively, were given 7.39 mils of gasoline in 148 mils of milk at each dose, the equivalent of the dose commonly recommended, and the others, weighing 26.3 and 22.2 kgm., respectively, were given 14.8 mils of gasoline in 148 mils of milk at each dose, the equivalent of Coffey's doses of ¼, ½ and ¾ ounce for lambs. The dose named was given to the lambs on each of three successive days.

Conclusion: From three experiments with gasoline as a whole, involving the use of nine experiment animals, the writers find that this treatment removed over one-fourth of the stomach worms present and had some slight efficacy for hookworms and nodular worms. This compares very unfavorably with the efficacy of copper sulphate for stomach worms when given in solution. The gasoline treatment has also the further disadvantages that it must be given three times, and in a vehicle such as linseed tea or milk, which is an additional expense. There is also the possibility of causing traumatic pneumonia, although the subsequent experiments with this drug indicate that gasoline is not necessarily more dangerous as a drench than is copper sulphate.

Petroleum Benzin

Sheep.—In order to determine whether the lessened volatility of the present-day gasoline was related to its inefficacy as a vermifuge, a test was made by the junior

(*Continued on page* 244)

Sulphur Gas in the Treatment of Mange

By MM. LÉPINAY, VIGEL and CHOLLET
Translated for the American Expeditionary Force.

TRANSLATOR'S NOTE:—*The general prevalence of mange among the animals of all armies gives to this subject at this time an importance of the first rank. In civil life it is only among the most careless that the disease is allowed to spread beyond the limits of control. In all my thirty years' experience, practicing among the large establishments of a great American city, in which are located the largest horse markets of the world, I recall but a single instance where veterinary service was so indifferently administered that this disease actually became a scourge. The rest of my experience with mange was with isolated cases or with a few cases here and there in large stables where its eradication was a simple matter.*

In war, the disease is different. Figuratively speaking, it has teeth, sharp, tearing teeth, that pester the poor brutes through a miserable state of emaciation to an untimely death. It punishes, tortures, and finally kills its victims by slow, but no less certain, stages.

In short, in war, mange is indeed an animal scourge that exacts a heavy toll unless energetic, scientific measures against it are promptly instituted and diligently maintained.

It is not a visitation upon one army since reports confirm its existence on each side of all fronts.

It is a disease that the American veterinary service must study seriously in search of a remedy that will cure rapidly and with certainty since all of the treatments yet employed have failed to meet both of these requirements.

The dipping vat containing the classical arsenic and sulphur solutions seems too slow, since animals must be dipped three to seven times at intervals of from four to six days before they can be evacuated to a disease-free observation place where the recurrent cases can be selected promptly to be returned for still further treatment. And even then with this care it has been found unsafe to return them to duty except to organizations where they can be kept together for a continued surveillance and where prompt measures can be taken to prevent the trouble from occurring all over again.

With these facts as a basis, the work of eradicating mange from animals to the satisfaction of any army in the field, it is plain, must be both effectual and rapid. That is to say, the bodies of the infested animals must be entirely rid of the parasites and this must be done in a short time. Additional measures to control re-contamination must be constantly employed.

THE report made by the authors follows one on the same subject which was made by them, April 17. The first work was based upon a report made by MM. Vigel and Chollet from experiments ordered in the D. C. M. of the Army. The following is the development of a second report by the same veterinarians on the application of the treatment of mange with SO_2 to groups of animals.

A few extracts from the first report are as follows:

"I do not pretend to teach my colleagues what sulphur is or what it is composed of," says the author, "knowing that it has been the basis for the treatment of not only nearly all skin diseases, as well as mange, but also for general disinfection.

"It is indisputable that sulphur even when applied pure by simply powdering it over the bodies of affected animals gives results. But this entails the use of large volumes of sulphur for meager results as it is not the sulphur itself that cures, but the oxygen constituent elaborated in contact with the secretions of the skin.

"The combustion of sulphur has always been considered as having an antiseptic and antiparasitic value. I have employed sulphur and the sulphates in the treatment of diseases of the skin,

chiefly of small animals, but while some have yielded to it, others were but little improved.

"Dr. *aide-major* Eugene Lépinay and I have, before the war, tried anhydrid of sulphur with success in the treatment of skin diseases of dogs and in the general disinfection of our establishments.

"Encouraged by these experiments, carried out with still greater care than in special hospitals, I proposed this treatment on observing our cavalry so seriously affected with mange and other skin diseases. For reasons to which I shall return later, our realizations were delayed for several months. On the propositions I made it was decided to undertake experiments, conforming to my directions, in a D. C. M. of the Army. At the end of several days I left the work to my confrères MM. Vigel and Chollet, having received another assignment. The experiments lost nothing and I congratulate myself on not having been left in the position of judge and jury and to have been able to give my collaborators full freedom of action."

The program where we left it was as follows:

1. Horses to be chosen from among mangy subjects, half of them to be clipped and the other half unclipped.
2. The duration of the affection, its seriousness and its peculiarities to be carefully recorded on individual cards.
3. A microscopic examination from lesions of each subject to be recorded on each card.
4. Each horse to be submitted to a sulphuration of half an hour and then placed in a stable methodically disinfected.
5. The horses to be given regular grooming the following day.
6. The duration of thirty minutes for the sulphuration to be modified, according to the results obtained.
7. The quantity of sulphur required for each treatment to be determined to establish the approximate cost of the treatment.
8. All incidents and accidents to be noted on the individual cards.
9. Veterinarians engaged in the work to report all modifications they find useful, for their information and that of their superiors.
10. Officers in charge of the remounts to provide all facilities for conducting the experiments and registering the results.

The experiments were conducted as rigorously as possible, following the prescribed program. The derogations explain themselves by the conditions under which we operated and by the results we obtained. The microscopic examinations did not furnish us with much help from the standpoint of diagnosis because of the scarcity of supplies and the difficulty of finding the parasites, but the animals treated were clinical cases which left no doubt as to the nature and severity of the malady.

Action of SO_2 on the Organism

Sulphur gas so far as we have been able to observe has neither a toxic nor irritating effect on horses while in the chamber nor after being removed. All animals submitted to the ordeal seemed indifferent and partook of the hay and oats placed before them.

Advantages of Sulphur Anhydrid

The employment of sulphur gas seems to be the method of choice in the treatment of mange in horses. The methods employed previously are: (1) antiparasitics in solution or in fatty menstra and (2) baths having generally pentsulphate of potassium as a base. Sometimes both are combined. The effects of baths (dipping) are satisfactory but as several immersions at different intervals are required to prevent toxic or painful accidents, the period of treatment is too long.

The inconvenience of pomades is recognized by all veterinarians. Mangy horses, always miserable and in a low physical state, do not withstand the suppression of the function of the skin caused by them and succumb. The animals cured by pomades are never in the same preserved state of health for the same reason and thus the duration of the indisposition caused by these treatments is increased. Besides pomades cause a dermatitis that requires a treatment as tedious as that of the mange itself. In short, the employment of pomades requires several applications and several successive ablutions, all done by untrained men who do not always

take the pains to reach all parts of the body, such as the region of the anus, the sheath, etc.

The SO_2 method has none of these inconveniences. Not only does it not produce any irritation of the skin but the following day the pruritus disappears, the epidermic scales detach, the buttons dry up, the skin becomes white and pliable and the folds flatten out. In a word, the animals receive only good effects from the treatment and the condition of the flesh during the period of observation rapidly improves.

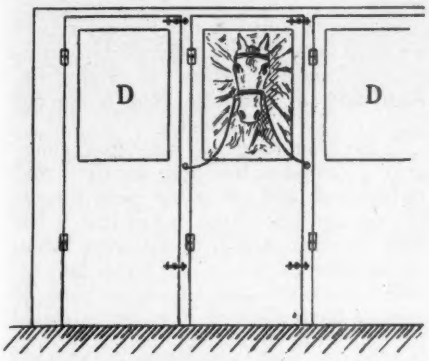

Fig. 1. Showing front entrance of the stall, with window for horse's head.

The use of sulphur gas has the advantage of requiring only easy manipulations: clipping, washing and a single sulphuration of two hours, during which time the gas penetrates to every part—not a fold of the skin escapes its action.

Conclusions

The aggregate of our experiments leads us to the following conclusions: The treatment of mange with anhydrid of sulphur is an *effectual, simple, harmless, rapid and economical* method.

1. *It is effectual.* In fact at the end of three days the special clinical symptoms of mange have disappeared and the skin has become normal as in health.

2. *It is simple.* No special personnel is required to apply it as the horse is absolutely saturated in a bath of sulphur gas.

3. *It is harmless.* Not a single horse treated has been harmed in any way by the vapor.

4. *It is rapid.* The animals are submitted to but one bath of two hours and the treatments required to cure them are two ablutions and sulphurations, all of which can be administered in one week.

5. *It is economical,* from several points of view: (a) because it does not injure the health of the animals and puts them in good condition rapidly; (b) because it thus decreases the period of unserviceability; (c) because it cures mange in the minimum time; (d) because the cost of the drugs used for *one horse* is for drugs only 15 cents; and (e) because the apparatus is not difficult to install.

Treatment Used for Other Ailments

I am extending the application of sulphur gas to the treatment of lymphangitis, especially the ulcerative form, and am trying it also in the cure of all necrotic wounds as well as in fistula of the withers and quittor.

I am also treating all wounds with sulphur gas, believing that its antiseptic value and its power of penetration will yield good results. I shall report to the Society on this point at some other time. MM. Vigel and Chollet have given, to the part of the head and neck not exposed to the gas, a simple treatment consisting of one washing and a rubbing with cresylated oil, and they have found that sufficient to effect a cure of these parts.

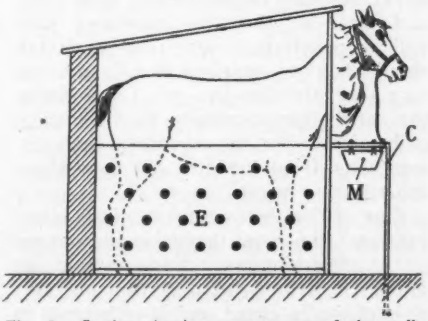

Fig. 2. Section showing arrangement of the stall. E. Perforations permitting the circulation of the gas throughout the stall. C. Safety bar. M. Feed box.

MM. Vigel and Chollet, who are absolutely affirmative on the cure of clipped and previously washed horses, are not so sure about subjects not clipped and washed. Their experiments appear

to give indisputable confirmation to this view. However, further along in their observations they establish the fact that the gas destroyed all the parasites in unclipped horses that were well groomed.

I have remarked elsewhere that my modest confréres were reluctant to interpret their experiments except where they were convinced, and probably erred in taking the disappearance of the clinical symptoms as their criterion, but do not all veterinarians know that itching continues even after all parasites have been destroyed—itching caused by dermatitis. Continued itching does not prove that the parasites have not been destroyed. I ask them to try their experiments again and I shall work side by side with them to show that the power of penetration of sulphur, when the temperature of the animal is raised by increasing the percentage of the gas, is such that the unclipped and unwashed horse can be cured just as readily as the others. This is of capital importance, especially during winters like this one. As the skin does not absorb sulphur it is therefore possible, by increasing the concentration, to cure mange without clipping and washing. It may always be necessary to rid the body of excrement, dust, mud and litter so that the encrusted skin will be penetrated more readily; and I should not be surprised if it is not the hair that prevents the gas from giving the same prompt results to the unclipped animals but the ammonia that disintegrates from the dirt and neutralizes the curative agent.

One of the chief concerns of all veterinarians who treat mange is the danger of re-contamination. For example, an animal is treated for a certain method; it is clinically cured and is either put in the section for serviceable animals or sent directly to the army; at the end of several days the symptoms return and new affected zones appear, the ova having only been partially destroyed has taken on new life, or the horses have become recontaminated from an infected place. With sulphuration these dangers seem no longer to exist and I have seen cases which prove that the skin deeply impregnated exhales the characteristic odor of sulphur a long time after the treatment. It is then possible to believe that the parasites not entirely destroyed, on coming out from within the skin are killed before producing new contamination, thanks to the deep impregnation and slow elimination of the sulphur compound.

Before passing to the second report we shall look into the anteriority of sulphur gas and the methods of production.

Anhydrid of Sulphur Not a Recent Product

It is interesting to note that anhydrid of sulphur has been baptized and re-baptized, and yet it has been forgotten and ignored to the extent that it has been commercialized at different times, under different names and under lamentable conditions, and sometimes men of science have allowed it to be exploited in their name and under their authority. As early as the 14th century Angelus Galla makes mention of sulphurous acid, its properties, and the formation of sulphuric acid when sulphur is burned in humid air. This gas has been known from the remotest antiquity, under the name of sulphur anhydrid. The procedure and the apparatus for producing it were described by Allemand Libarius in the 15th century and it was studied later by Priestley, Berzelius and Guy-Lussac. Its antiseptic properties and antiparasitic powers, universally recognized, were confirmed by experiments done in France as well as elsewhere.

There are no *anhydrids* of sulphur or gases this or that; there is but one and that is anhydrid of sulphur more or less pure.

The apparatus itself is of little importance. With its simplicity or its intended and calculated complication it has but the single quality of elaborating sulphur anhydrid, a product, which, as we have shown is well known and by no means new. It is now forty years since Pr. Pettenkafer disinfected ships with SO_2. Riches disinfected the postal wagons in the same manner and at about the same time. Trooste writes in his treatise on chemistry: "We use sulphurous acid to destroy the parasites of mange in the form of fumigations." It also destroys the germs of contagious

diseases in hospital wards and when so employed it disinfects covers, bedding and mattresses."

The dictionary of Dupinay of Vorepierre, 1864, says: "Sulphurous acid employed in the form of fumigations is one of the most effectual remedies against mange. The nude patient is seated in a case enveloping everything except the head and then the vapor is driven into the case through a tube by simple combustion of sulphur." According to J. Girardin, the idea of curing mange with sulphur gas belongs to the chemist Glaubert (1869), "ten fumigations," says the learned professor, "suffice to cure simple cases of mange. Each one costs but 9 mills, or one complete treatment for 10 cents. Is it possible to cure cheaper?"

With all due respect to *lé vétérinaire aide-major principal* Dupuy we should know that the method which we praise and which we have shown is not new, was tried by one of our confréres, M. Guerin, who has treated mange by placing the animals in trenches covered with branches, in which he burned sulphur.

M. le Pr. de Parasitologie aide-major, Henry, who has made a careful study of mange has stated that there were two medicants that cured mange—cresyl and sulphur. He attributed the value of the latter to the liberation of anhydrid ot sulphur in contact with the secretions of the skin, as noted above. Cresyl, like crude petroleum, acts in the same manner. In recent researches we have learned that the latter contains certain quantities of sulphur. Nothing new again, since Marco Polo in the 13th century mentioned that crude petroleum, oil of Bakou and oil of Gabain were employed with success in the cure of mange in camels. In fact, the same as sulphur gas and its properties and uses have been forgotten to the point of having been used under different names, so have we been considered as its originators and the discovers of its merits. But we make no such pretentions. We claim only to have conceived the method of treating the horse under simple conditions and in a practical and economical manner, thanks to the studies of one of us (*le vétérinaire aide-major* Lépinay) before the war.

In the second report MM. Vigel and Chollet says, "It is by basing our confidence on the merits of sulphur gas, on experiments already made and tests for results, that we undertook the work." The initiative of the procedure and its use in the treatment of mange of horses is therefore entirely ours."

After tests of the apparatus of commerce, made for other purposes and which did not meet our purpose, we conceived a generator of sulphur gas that is suitable, thanks to the *Missions d'Essais et d' Experiences,* type of the *Sous-Secretariat des Inventions.*

We shall describe the treatment of horses in groups so far as the method has been used.

The cuts and drawings herewith show the simplicity of the apparatus and our confréres are afforded the opportunity of following our method and of making improvements.

Necessary Appurtenances

The apparatus comprises two parts: (1) the apparatus to generate the gas and (2) the sulphuration chamber.

The generator is composed of three parts: (1) A hermetic burner, (2) a blower, and (3) two tubes perforated here and there which extend well into the chamber. The aspiration tube enters the top of the chamber and the delivery tube at the bottom. (The apparatus installed at the American Remount Depot has these tubes reversed. The aspiration tube, of sheet iron, simply extends into the chamber a few inches, while the delivery tube, which is a square conduit made of boards, extends along the whole chamber superiorly and in the rear.—**Translator.)**

Operation of the generator. The air of the chamber is aspirated by the blower where it is blown into the sulphur drawer to excite combustion; the resulting gas is then driven into the chamber through the delivery tube. The perforations in the tube allow an even diffusion of the gas mixture in the chamber.

The sulphuration chamber should be hermetic and its dimensions as small as possible.

(To be continued.)

Problems of Tick Eradication*

By W. H. DALRYMPLE, M. R. C. V. S., Baton Rouge, La.
Professor of Veterinary Science, Louisiana State University.

AMONG the most desirable and valuable requisites of the man with authority are an accurate knowledge of the work over which he presides and the gift of being able to handle other men satisfactorily. Although a man may be a master in the details of his work, yet if he is lacking in the personality and tact necessary to success his manner is more liable to repel than to attract people to him,with the resultant lack of co-operation afforded him and consequent hindrance to the accomplishment of the ends desired.

It is generally conceded that the greatest obstacle to the most successful prosecution of veterinary sanitary work, in which may be included tick eradication, is the gross ignorance of the people as to the procedure and the ultimate result sought. Antagonism is displayed despite the fact that the work is carried on for their individual benefit and that of the community and state in which they live. And yet, without some effort being consistently and continuously exerted to dispel such ignorance, final success must of necessity be considerably delayed. Hence, in this particular phase of the work, success depends largely upon the man in authority being endowed with personal magnetism and tactfulness.

Those who have been in touch with tick eradication since the beginning of the campaign knows the trials and tribulation through which the inspector has had to pass and the many obstacles which have incessantly confronted him. While many of these have been overcome there still exist, and will to the end, problems of a similar character which must be tackled.

In mentioning a few of these obstacles I think we may give ignorance, which might be extended to gross all-around ignorance on the part of the laity, the very first place: Ignorance concerning the true object to be attained; ignorance regarding the fever tick and its life habits; ignorance concerning the methods of procedure for the destruction of the parasite and the fever with it; and ignorance as to the value of the work to the individual cattle owner, etc.

It appears to me, that with an average amount of tact, and a little more condescension, if you will, a great deal of this ignorance might be dispelled by a little man-to-man and heart-to-heart talk concerning the various phases of the problem. In other words, letting in the true light to the darkened understanding, for the normal individual, even with the densest sort of comprehension, may be made to see and understand, if only the problem is clearly explained to him and more particularly if it is done in a tactful way and in a manner which appeals to the man, arouses his interest, and gains his confidence, friendship, and good will.

True, suspicion is a dominant factor with many of these people. But this, too, is born of ignorance, through erroneous information preferred by similarly ignorant or suspicious individuals. But once ignorance is dispelled, suspicion also will gradually vanish.

Lack of Co-operation a Tremendous Obstacle

The lack of co-operation is a tremendous obstacle in the prosecution of this important work; and where are we to place the cause for this lack of sympathy —if not in the ignorance of so many of our people? Co-operation suggests correct understanding and enthusiasm; and once the people get understanding through enlightenment, co-operation is bound to follow. It cannot be otherwise; a man may be ignorant, but that is no indication of his being a fool, to his own detriment, if once he sees the light.

There is another class of people who, although they may not be wholly ignorant of conditions, yet for selfish personal reasons frequently obstruct the progress of tick eradication. I refer to the man

*Abstract of paper read at the conference of B. A. I. inspectors in tick eradication, New Orleans, January, 1918.

with cattle but with insufficient or no pasture of his own and depending for the sustenance of his cattle upon free range or the generosity of his neighbor. This man fears a stock law which he considers would interfere with his business, and for purely personal reasons he has no sympathy with the work and blatantly calls out for "personal liberty," which he seems to interpret as the right to selfishly benefit himself at the expense of his neighbor and everyone around him. Then we have the unpatriotic citizen who seems to object to contributing his due share to taxation through legitimate assessment of his cattle, which he believes the work of tick eradication would force him to do. We are all familiar with these obstructionists, and time will, of course, eventually eliminate them through the general enactment and enforcement of suitable legislation. This desirable result, however, may be very materially augmented by accurate information judiciously and tactfully imparted to the people themselves.

But there is another class of obstructionist who bobs up periodically and who, unfortunately, is rather effective in his methods. I refer to the little politician with some petty political office in view. This man carefully feels the pulse of his community regarding the tick eradication question, and if he finds that ignorance prevails and consequently an aversion to the work, he loses no opportunity to add to this ignorance and to strengthen the people in their spirit of aversion. He simply plays upon the credulity of the uninformed, so that he may successfully ride into office through their votes.

This type of citizen usually knows better, but his campaign is conducted in an absolutely selfish manner, without regard for the real good of his neighbors or for the successful development of his community or of his state. He is a dangerous man, however, because through his sophomoric campaign talks and speeches he is frequently able to sway the minds of the people, and in some instances the minds of the local authorities in the county, whose assistance and co-operation are so much needed to successfully carry on the work, by posing as the "friend to the poor farmer" against imaginary governmental aggression.

But even in a case of this kind there is a remedy. The "toxin" of ignorance must be carefully combated by the judicious use of the "antitoxin" of knowledge. In other words, our poorly informed people must be educated, so that they may be able to think intelligently for themselves and base their conclusions upon proved facts.

To me this whole matter seems to resolve itself into two main issues:

1. The fact that great ignorance still prevails concerning the work of tick eradication, and which must of necessity be dispelled before we may hope to reach the goal of tick-freedom in the shortest possible time; and

2. That the only feasible method to accomplish this, as I see it, is through the education of the people; which I believe will largely devolve upon the county inspector, who is presumed to come into daily contact with the cattle owners in his immediate locality.

Inspector Must Be Educator

This would suggest, therefore, that the inspector must not only be familiar with every phase of the work, but he should be an educator—shall I say of the kindergarten type, because it should be remembered that his "pupils" are but babies in knowledge of the problem he is trying to solve. He should be patient, tolerant, and sympathetic, but withal he should be firm, and he should be a student of human nature, so that he may draw the people to him by being able to adapt himself to their various idiosyncrasies, their peculiarities of temperament, etc.

Education, therefore, is the surest weapon we possess with which to bring the tick fight to a "peaceful issue" in the shortest time possible, because it will bring with it all other measures necessary to accomplish the final result.

Magnificent work has already been done in the face of all the obstacles mentioned, and no doubt others which I have failed to allude to. But there is a great deal yet to be accomplished, and there is still an immense amount of gross ignorance, and what I have said is more in

the nature of an appeal to those who expect to be in the fight during the remainder of the campaign.

Finally, we must always bear in mind that this country is at grips with the most powerful (military) and relentless foe which possibly the world has ever known, in the greatest conflict of which there is any record in history, and on the outcome of which depend momentous consequences. Therefore everything that it is possible to do to conserve and increase the food supply in meat and meat-food products at this time of stress, and for some time in the future, should be done, not alone from the standpoint of patriotism but as an absolute necessity, in fact a war measure; and I am of the opinion that the successful early completion of the work of tick eradication in the South will be one of the most potent factors in aiding our country and our associates in the war to decide the conflict favorably.

Conservation Slaughter

By W. W. DIMOCK, D. V. M., Ames, Iowa,
Professor of Pathology and Parasitology, Iowa State College.

BY conservation slaughter is understood the slaughter of all animals that are in danger of death or deterioration from injuries and disease, or that for various reasons are unprofitable, that their flesh may be utilized for food. Further, conservation slaughter should be carried out on all animals even though the flesh is unfit for human food provided: (1) that they are suffering from any condition that is incurable, (2) that the time and expense make treatment unprofitable, (3) that during the time of sickness they expel from the body highly infectious material that contaminates the quarters and thus exposes other animals. All such animals are to be utilized as explained below.

The plan for conservation slaughter is to be carried out in connection with the general movement and necessity to conserve the food supply of the nation and to stimulate increased production. A few unprofitable animals in each herd and flock of the state make a total, the consideration of which is worthy of our most serious attention. Data at hand show that in the herds and flocks of Iowa there are many hundreds, even thousands of animals that are being kept at a very serious loss in these times of high feed costs. A few such animals in the past have had no appreciable effect upon the economic question of livestock production in Iowa, and largely so because of the great quantities of food stuffs that were available at a comparatively low price. At the present time, however, when we stop to consider the high cost of all food stuffs consumed by animals and the rapid increase in the retail price of all meat-food products, it is forcibly brought to our attention that there is a great unnecessary economic loss sustained from keeping among the flocks and herds of the state, animals sick with diseases that make them a source of danger to their fellows or that will finally result in their deterioration or death, or that are not up to a reasonable minimum production, or that are from any cause decidedly unprofitable. All are fully aware of the desirability of making provision for the most satisfactory disposal of such animals. Many of the animals coming under the class mentioned above may be disposed of for food purposes through the regular channels of sale. However, if any individual shows evidence of ill health, or is suffering from an injury or local disease, the sale price is very materially less than the actual value of the animals for food purposes, and again, the condition of the animal may be such as to make it impossible to ship any distance. In order that all animals

* Presented at the thirtieth annual meeting of the Iowa Veterinary Association, Iowa State College, Ames, Iowa, January, 1918.

still fit for human food may be utilized for such purposes, and the owner receive at least the approximate value for food purposes and thus in every way possible help to prevent loss and at the same time conserve the meat-food supply, I believe that we should make every effort possible to handle them under what we may term "conservation slaughter."

Before attempting to handle animals that would naturally come within this field, it will be necessary to inform the owners and live-stock dealers of the state concerning the purpose and necessity of starting a movement of this kind, and to give more or less specific directions to the owners and veterinarians of the state regarding the inspection of animals desirable to ship or to be handled locally under conservation slaughter.

In carrying out conservation slaughter at the present time I would propose that it be accomplished or undertaken, in general, in one of the three following ways:

1. When possible all animals that are to be disposed of for the purpose of conservation shall be shipped to a point having an abattoir that maintains federal inspection.

2. Slaughter be carried out in connection with a local or municipal slaughter house, or on the farm, and the carcass inspected by a competent local veterinarian.

In cases where animals are slaughtered under the general plan suggested in connection with conservation slaughter, the inspection of the carcass should in all cases be performed according to the rules governing inspection as carried out by the meat inspection service of the Bureau of Animal Industry, United States Department of Agriculture. In case the meat from animals killed under the plan of conservation slaughter in local abattoirs or on the farm is to be offered for sale, the veterinarian making the inspection should be approved by the executive officer of the Animal Health Commission of the State of Iowa.

The classes of conditions for which the majority of animals so affected may with safety be used for food purposes under conservation slaughter are:

1. Accidental injury of healthy animals. For example, broken legs, wire cuts, hook cuts, or deep wounds from any cause, the location or nature of which makes recovery uncertain or unprofitable.

2. Local diseased conditions or diseases that remain local throughout their course or that have little or no tendency, especially in the early stages, to become general in character and that have from experience been shown to be of no danger to the human when the flesh is used for food following removal and condemnation of the affected part or parts. For example, actinomycosis of cattle, caseous lymphadenitis of sheep, scirrhous cord of pigs, granular vaginitis of cattle, polyarthritis of pigs and many organic diseases.

3. That class of diseases that are local and chronic in nature but tend to cause loss of condition in the animal, thus materially reducing its production and often finally terminating in death, either because of marked changes in the part affected or because of the frequency of secondary infection. For example, parasitic diseases where the parasites tend to localize in some particular organ or part, as nodular disease of sheep, echinococcus in the liver of the pig, pulmonary strongylosis, scabies, chronic organic diseases, paralysis of pigs, chronic local inflammations, tumors, etc.

4. Systemic and constitutional diseases that do not in the early stages necessitate condemnation of the carcass, but that do upon becoming generalized render the carcass unfit for human food and necessitate total condemnation. For example, rachitis, sniffles or infectious rhinitis in pigs, tuberculosis, leukemia, anemia, and diseases of the nervous system.

5. Those acute and chronic non-infectious diseases that not infrequently result in the death of the animal, such as choke, urinary calculi, rupture, arthritis, acute indigestion, intestinal intussusception, etc.

6. Those acute infectious conditions for which there is no cure and for which prevention is uncertain or inadvisable, the disease spreading more or less rapidly and often causing death of a large number in the herd or flock. For example, hog cholera, swine plague, hemorrhagic septicemia, stomatitis, foot and mouth disease, etc. The slaughter of animals to prevent their becoming infected in the case of an outbreak of an acute specific infectious disease in the herd or flock must be carried out with great care, and this applies particularly to those herds that are in a fattened condition and ready for the market.

7. Those animals that are economically unproductive, including nonbreeders and unprofitable producers. For example, sheep, cattle and swine that fail to breed because of some malformation, or because of some diseased condition of the ovaries, uterus, or udder, or animals that have become nonbreeders from any of the various complications associated with infectious abortion. Many such animals can be recognized upon a thorough physical examination. Examples of unprofitable producers other than for breeding purposes are to be found in cows that are being kept for dairy purposes, and animals for fattening purposes that fail to make proper gains because of type or constitutional condition.

The great importance of the object to be obtained from the carrying out of conservation slaughter is further supplemented by the saving of stable room, time spent in care, and feed stuffs that sick and unprofitable animals consume without making any gain in flesh, or producing in a way that makes them profitable. Many of the sick animals will finally die, resulting in almost a total loss of both the animal and the food that had been consumed.

In the Service and Regulatory Announcements published by the Bureau of Animal Industry, United States Department of Agriculture, are found in the last few numbers many items dealing with the conservation of meat products as being carried on by the Federal Meat Inspection Service. In the issue of October 20, 1917, is found the following:

> For the purpose of promoting the conservation of meats and products the bureau's conservation committee visited a number of representative plants, conferred with the proprietors and operators of official establishments, and studied operations and procedures to see how such conservation might be promoted consistent with approved meat-inspection methods.

As a result, they report on the following phases of conservation:

Lean meat. All careless and inefficient trimming of pork cuts, and the unnecessary loss of particles of lean meat left on the fat trimmings are to be avoided as much as possible. This lean meat has little value as fat but a maximum value as meat for food.

Fats. The committee recommends that where possible, all fats should be so handled as to conserve them for food purposes, that is, that no edible fats shall be permitted to become inedible through failure to properly handle them.

Canning operations. That all canned products shall be inspected immediately after filling; all leaky cans to be soldered and re-sterilized within the time prescribed by the regulations (six hours) so as to prevent their contents from spoiling.

Cured meats. It is suggested that every establishment use every possible care in curing so that losses may be reduced or entirely prevented.

Other suggestions made were that great care should be taken in connection with the proper handling of meats, to prevent their becoming soiled, and spoiling from lack of proper refrigeration, especially in connection with transportation; also to avoid packing of meats in unsuitable containers for shipment.

There is also a note on the rough handling of live stock, suggesting that the managers of slaughter houses and stockyards prevent, so far as possible, the rough handling of live stock, thus reducing the number of bruises, this entailing a loss since bruised meat has a value for tankage only.

In the Service and Regulatory An-

nouncements for October 11, 1917, there is a statement on the use, preparation, and handling of meat passed for sterilization. In the past, our inspection service has in the main recognized only two classes, and as a rule the establishments have been prepared to handle only the two classes, these being "U. S. Inspected and Passed" or passed unconditionally, and "U. S. Inspected and Condemned" as unfit for food. At the present time the Bureau (Meat Inspection Service) is recommending that certain meats be passed for sterilization (U. S. Inspected and Passed for Sterilization) providing the establishment has facilities for properly sterilizing the meat, the rule being, that it shall be heated to a temperature not lower than 170° F. for a period of not less than 30 minutes, and that the product shall be prepared and marketed according to the requirements of the Bureau.

In the Service and Regulatory Announcements for July 3, 1917, under the heading "Conservation of Meat Food Supply," is given a full statement regarding the purpose, object, and necessity for the conservation of meat. It is believed that conservation of a material nature can be accomplished without surrendering the purpose for which inspection is maintained.

Conservation of Hides, Fats and By-products

Since the government through its Federal Meat Inspection Service in co-operation with the abattoirs of the country is doing all in its power to conserve the meat products of the country, it would seem that the state, county, town, municipality, and the farmer should take an active part in attempting to bring about conservation, and that the state and its representatives that are in a position to do so should furnish the farmer, live-stock owners, and the veterinarian with the information necessary to accomplish this without in any way endangering the live-stock interests as a whole or the health of the consuming public.

Considering the great importance and almost vital necessity of fats as used in connection with the war, provision should be made for the utilization of all animals that die or are killed because of a diseased condition that renders their flesh unfit for human consumption, through arrangements to save the hide, render the carcass to obtain the fat, and prepare the refuse for tankage or fertilizer. During the last few years, in many of the large and small towns and cities of the state, rendering establishments have sprung up and are doing a profitable business. However, there is room for the introduction of many other such establishments. These establishments, in my opinion, should be licensed and every stockman in the country should be informed regarding the advantage of having the men connected with these rendering plants call for all dead or dying animals, that the carcasses may be salvaged. I further believe that the state through its Animal Health Commission should supervise the type of conveyance by which dead animals or diseased animal tissue may be transported from the farm to the rendering establishment, and also supervise the general sanitary condition of the establishment itself. Personally, I can see no reason why, for the present at least, pigs dying of cholera or animals of hemorrhagic septicemia, and from most of the other infectious diseases, could not with safety, if carried in a properly constructed tank, be transported from the farm to the rendering establishment and utilized for grease and tankage. Pigs dying from hog cholera are utilized for such purposes where the carcass can be used without being transported from one point to another.

Discussion

DR. K. W. STOUDER: This subject of "Conservation Slaughter" is indeed a timely and very practical one for discussion. We are told that fats are very essential to the conduct of the war, and yet it is easy to compute that in hog losses alone, Iowa, in one year when disease was not particularly prevalent among our swine, saw more than 1,200 tons of fat absolutely wasted, and this is estimating that each

hog carcass would have yielded only 10 pounds of fat. If these fats were worth 10 cents per pound, which is easily below the present market for inedible grease, we have lost about a quarter of a million dollars in hog fats, to say nothing of the proteins which would be by-products of the rendering and exceedingly valuable hog feeds, and worth at least another $100,000 or more, at present prices.

Our extension and veterinary investigation departments have had reports from practically all parts of Iowa showing heavy losses at times among other classes of live stock, particularly hemorrhagic septicemia among cattle. In some of these cases, because of fear on the part of the owner, not even the hides are saved, much less the carcass fats and by-products, yet a well organized rendering service could have saved labor, fats, and glycerin, and lessened the spread of infection. Modern invention has improved methods and increased savings materially in all branches of business, and we must soon expect to see the truck with tank-constructed box going out over areas of country collecting the carcasses of animals for rendering, for they are proving practical where used already. It occurs to many of us that adoption of such a system should be speeded up, and the plan extended and perfected so that not only the dead carcasses may be salvaged, but that the unprofitable animal, the accidentally injured, and the chronically sick, but still partially valuable, animals may be easily and cheaply disposed of under a system which utilizes their complete value, and yet most certainly protects the consuming public as well as the surrounding live stock from exposure to disease.

These possible economies are well known to every veterinarian. Few others are informed regarding their extent and it is your duty to your country to see that these savings of fats are made in your community just as far as is possible. The furtherance of such plans by assisting capable and experienced rendering concerns to find suitable locations, the education of the stock owner to utilize such plants and service, and the posting of ourselves upon the subject of meat inspection until we can give good advice as to the salvage in a carcass fit for human food, can be one of our contributions to the welfare of our country at this time.

DR. CHAS. MURRAY: There are two forms of conservation discussed by Dr. Dimock which impress me as deserving of emphasis, viz., emergency slaughter of animals on the farm and utilization of fats from animals dead through accident or disease. In the work of our department, we are frequently called upon by correspondence to render a decision as to the advisability of making some use of animals destroyed or dead of disease. These requests come mainly from the laity and the increase in numbers of such inquiries leads me to conclude that they are ready to do their part in conservation of such material. Samples of meat are frequently received with a request that they be examined to determine their suitability for food. These samples come from fat animals that have choked, frozen part of their bodies, or met with accidents that render them helpless, etc. We are in a poor position to render a decision except from the history given, for the parts sent are invariably muscle from a part of the body entirely removed from that affected by the injurious agent. Here, it seems to me is the opportunity for the local veterinarian. He is in a position to inspect the carcass and to make an intelligent decision in the matter. He is in a position to encourage his clients to make use of such material as is fit for food, and the client can well afford to pay him liberally for his time and services.

There is an increasing sentiment among stock men in regard to utilizing the carcasses of animals for food for hogs or for the fat. I believe every farmer can well afford, in case he does not have the advantage of a collection system for dead animals, to construct a crude, low-priced rendering plant where he can render out the fats to be sold at a remunerative price, and

cook the fleshy parts of the carcass for food for his remaining animals. The price realized from the sale of the fat will pay well for the time and labor necessary for cooking the carcass, and the fact that when the process is completed the carcass has been satisfactorily and safely disposed of ought to be of additional value in that sanitation is thus properly preserved.

DR. J. I. GIBSON: I have been interested in this paper because I have been giving the subject serious consideration. I believe conditions and circumstances, as they now exist, make it the duty of all owners of breeding animals to keep only such animals as are proven breeders, of course, including young animals which are most certain to prove breeders. I believe it is the duty of all owners at this time to sacrifice such animals as have proven barren and to keep in their places sure breeders or young animals to be tried out as breeders. The cattle men (breeders of pure-bred cattle) have always carried in their herds animals favored on account of their blood lines that will not breed and are, therefore, a bill of expense and are not proper animals to sell to any purchaser other than the packer or butcher. With the increased demand for meat all such barren animals should be sent to slaughter, thereby increasing the meat supply and conserving the feed heretofore consumed by the barren animals that are entirely worthless from the breeder's standpoint. I believe every farmer in Iowa should increase his breeding herds of cattle, sheep, and swine, and that no more worthless, barren animals should be carried from year to year in our breeding herds.

I am also interested in the supplementary part of Dr. Dimock's paper on the conservation of hides, fats and by-products of our dead animals. I figure the hides, fats and by-products of the dead animals in Iowa properly conserved will bring to our people about $10,000,000 a year. From the information I can gather only about 10 per cent of these valuable products is conserved by the rendering plants now in operation in the state. About half of the value of these carcasses is represented in the fats, the balance in the hides, tankage, fertilizer, and by-products. These commercial fats now bring about $15 per hundred.

The fats contain a percentage of glycerin which varies from 4 to 12 per cent and would average 6 per cent. Glycerin is worth from 75 cents to $1 per pound and is likely to continue to rise in price, especially during the duration of the war. The demand for glycerin is the real cause of the present high price of all fats. Glycerin is used in the manufacture of explosives, therefore no argument should be necessary to convince the people of the state and nation that all fats carrying a percentage of glycerin should be conserved and the glycerin extracted, lest there come a time in this great world struggle between autocracy and democracy when there might not be sufficient glycerin available to the United States and our allies for the manufacture of the necessary explosives to destroy the Hun or drive him back across the Rhine. Any laws existing upon our statute books that require the burning or burial of the valuable animal carcasses should be disregarded by the War Department, and an order should be issued commanding the people of this and all other states to conserve all fats from animal carcasses, in order that the glycerin might be extracted therefrom and an ample supply of this valuable product conserved for the purpose of administering a sound thrashing to the Teuton armies. The scarcer the supply of glycerin the higher the price will be of all these fats. I estimate an annual waste of 20,000 tons of non-edible fats and grease in the state of Iowa, which I believe should be conserved and could be saved without interfering with the sanitary work of the state in the control and prevention of the spread of diseases of live stock. The rendering process will sterilize the products and therefore render them harmless. I therefore, hope to see some action taken by the War Department calling for the conservation of all animal fats.

The British Army Veterinary Service*

By MAJOR RAINEY of the British A. V. C.

THE present work and organization of the Army Veterinary Service afford a striking instance of what can be achieved in a short time when science is adequately assisted by finance and in other ways given facilities fairly adequate to develop its latent possibilities. The existing war is the first recorded in military history in which the veterinary service of the army has been permitted and assisted to carry out a definite scheme of its own generation, and it is this fact which gives most interest to a critical examination of results as they stand today.

The British nation has been blamed by other nations and by its own citizens for its disregard, in the past, of science, but the Royal Army Medical Corps and the Army Veterinary Corps of the present constitute a powerful argument for those defenders of British sanity who maintain its capacity to adapt to practical needs, ideas which other, possibly more imaginative, nations have visualized more fully, but have not always in the last resort so completely developed. The old English proverb "Sharp's a good dog but Holdfast's a better" may perhaps be taken to express this national characteristic.

Primarily an army veterinary corps must justify its cost on economic grounds. The humanitarian factor, although it plays an important part in the practical work of the corps, cannot for purposes of war on a modern scale be held alone to justify the cost of so extensive an undertaking as the army veterinary corps of the British Army today.

It is not possible at this stage to draw up a balance sheet that would accurately, or even approximately, show what dividend the nation derives from its capital outlay in this respect, but the following figures present, it is thought, a fair prima facie case in favor of an army veterinary service as an economic factor in war.

The total wastage[1] among horses and mules of the British forces at home and expeditionary forces abroad, including losses from enemy gunfire and all other causes whatsoever, during the year ending December 31, 1916, amounted to 13 per cent of the total animal strength.

The total wastage among horses and mules of the British forces during the year 1912 (i. e. during peace) amounted approximately to 14.80 per cent of the total animal strength.

These figures mean that in spite of continuous losses from enemy gunfire, and from inevitable chances and vicissitudes of war, the annual wastage among probably the largest number of horses and mules ever collected together has, during the last complete year of war, actually been less than the former rate of wastage in time of peace. This notwithstanding the fact, bemoaned by humanitarians, that the bulk of the animals have been standing night and day in the open exposed to all weathers, whereas in time of peace all army animals are stabled under the best hygienic conditions.

The average annual mortality among army animals participating in the South African War, 1899-1902, exceeded 55 per cent per annum for the whole year.

There was no army veterinary corps in those days. The army veterinary department, as it was then, consisted of only a few officers and auxiliary civil veterinary surgeons whose duties for all practical purposes were limited to professional attendance upon such sick and wounded animals as chanced to come within their narrow military scope.

Proposals for a better organization, indeed for any adequate organization, were coldly received. The military chiefs of those days in common more or less with the rest of the community had little

*Portions of this report relating to the conduct of schools for army farriers and to the activities of the Royal Society for the Prevention of Cruelty to Animals in obtaining motor and horse-drawn ambulances for the veterinary corps of the army have been omitted. Details of the work of the veterinary corps in South African campaigns in eliminating animals infected with rinderpest from the meat ration of troops have also been omitted.

[1]The expression "wastage" includes deaths, destructions, missing and castings for destruction or sale. The mortality alone in 1916 was 9.47 per cent.

confidence in their veterinary advisers and relied largely upon the time-honored fallacy that all such subsidary technical matters were of slight, if any, military importance.

Considerations of more legitimate military importance may have led in 1899-1900 to a cavalry campaign for which no hay was thought necessary, resulting, for example, in that memorable occasion on which a brigade of cavalry marched out from Bloemfontein under 100 strong, the remainder *hors de combat* for the most part from bulk starvation and consequent debility of their horses.

Major W. E. Watson, D. S. O., 6th Dragoon Guards, who marched out with the "Brigade" on that occasion places the strength of effective mounted men as low as fifty.

It is not, however, claimed that the South African War of 1899-1902 and the present European War are exactly parallel cases from a veterinary point of view. It is not necessary to make such a claim since there is a wide enough margin between an annual equine mortality of 9.47 per cent and 55 per cent to permit of considerable departure from the parallel, without affecting the validity of a statement that on the whole the better results of the present war in equine matters are chiefly attributable to the work of the army veterinary service.

If the South African War was one of marching and counter-marching, then this war has been one of hauling and straining to drag vehicles and guns of all descriptions through tenacious mud, under conditions of the greatest hardship and discomfort. Moreover, although there has been little cavalry work in France, Egypt has afforded opportunity for some extensive operations in this respect, and, in the fighting against Bulgaria during 1916 very heavy work was required of the pack-transport animals. Statistical returns for the German South West African Campaign and Rebellion, August, 1914, to July, 1915, and for the subsequent period July, 1915, to March, 1916, show an annual mortality at the rate of 9.09 per cent among animals (horses and mules) of the Union Forces.

The conditions in this campaign were similar in most respects to those of the South African War, 1899-1902, with this considerable difference that the Union Government was careful to include in its forces an army veterinary corps, identical as far as possible in its organization and proportionate strength with the army veterinary corps of the Imperial Army.

There are thus three distinct figures from which deductions can be made:

1. Those of South African War, 1899-1902, with an annual mortality of 55 per cent.
2. Those of German South West Africa, 1914-1915, annual mortality 9.09 per cent.
3. Those of the European War, 1914-15, 16, inclusive of campaigns in France, Egypt and Salonika—annual mortality under 10 per cent.

If it may be permitted to indulge in a little loose algebraic discussion, then:

Let 'A' be taken to mean an army at war.
Let 'B' be taken to mean an efficient army veterinary corps.
Let 'C' be taken to mean the peculiar conditions of a South African war.
A and B minus C equals an annual equine mortality of 9.47 per cent.
A and B and C equal an annual equine mortality of 9.09 per cent.
A minus B and C equals an annual equine mortality of 55 per cent.

The above very simple equations certainly appear to indicate that plus B, otherwise an efficient army veterinary corps, bears an important relation to mortality among army animals in war.

It is true of course that there is an economic limit to the dimensions and utility of an army veterinary service or of any other administrative service, but that point does not seem yet to have been worked out by calculations. It would appear to be important actuarially to establish precisely what proportion expenditure on each administrative service should bear to the cost of an army or other national undertaking as a whole, so as to be productive in the long run of the best economic results.

This is a field of scientific inquiry, so far as military operations are concerned, in which little or nothing has been accomplished. At the beginning of the war there were published in the daily newspapers letters from ill-informed and distressed humanitarians in which statements were made to the effect that an army horse lasted only for a few days after arrival at the front. How unnecessarily these good people distressed themselves and a sympathetic public may be deduced from the above announced annual death-rate which, it is believed,

gives the war horses five years expectation of life after being posted to the British Expeditionary Force.

The officers of the Army Veterinary Corps are graduates of British and Colonial veterinary colleges, with the exception of quartermasters appointed for duty as such to veterinary hospitals. Horse convalescent depots, base depots of veterinary stores and schools of farriery.

The Personnel of the Veterinary Corps

As there exists a good deal of misconception among the general public concerning the degree of professional education required for purposes of graduation as a duly qualified veterinary surgeon, it may be stated that the curriculum of a modern veterinary college extends over four years, that is one year less than the period required for graduation as a practitioner of human medicine and surgery. The curriculum embraces the same subjects as those of the medical student, modified or extended where necessary to meet the different requirements of the domesticated animals. It is estimated that about 40 per cent of the entire veterinary profession of this country are now employed as officers in various capacities with the Army Veterinary Corps. The number of officers and other ranks in the Army Veterinary Corps available for duty on mobilization in August 1914, were: officers 109, other ranks, 322, including reservists. Today August, 1914, were: officers 109, other there are over 1,200 officers and considerably more than 20,000 non-commissioned officers and men, exclusive of native Indian and Egyptian subordinate personnel. The personnel of the Army Veterinary Corps is, therefore, like that of other branches of the service, chiefly composed of officers and men who have joined the colors since the outbreak of war. No man passed fit for service with front line combatant units has been accepted for enlistment in the Army Veterinary Corps (Regulars) since September, 1915, and of those enlisted prior to that time nearly 3,000 have been transferred to R. N. and B. F. A. and replaced by Class B recruits. So far as possible men accustomed to horses were enlisted, but this source of supply proved to be limited in view of the prior claims of combatant arms, so that it has been necessary to train *ab initio* what appeared most unlikely material. Fortunately the material proved better than official fears. What was lacking in experience was found fruitful in intelligence, and the impression has been gained that for instruction in scientific principles it is as well to have intelligent virgin soil as painfully to have to modify the little knowledge that in veterinary matters especially "is a dangerous thing."

The present personnel as a whole is keen, enthusiastic, and imbued with those ideas of humanitarianism and helpfulness which are essential to useful work among dumb and comparatively stupid animals.

The work of the army veterinary service comprises:

1. The examination for soundness of all animals prior to their purchase for the army.
2. Care of remounts on board ship.
3. Prevention and control of contagious and other disease among all army animals.
4. Treatment of minor cases of sickness and injury under regimental arrangement with the unit to which the animals belong.
5. Evacuation to veterinary hospitals of all cases of sickness or injury that cannot be treated properly with the unit, or that, for military reasons, it is not desirable to retain with the unit.
6. Maintenance of an efficient standard of horse-shoeing throughout the army.
7. Supply of veterinary medicines and equipment.
8. The training in schools of farriery of shoeing-smiths and cold-shoers required for the army.
9. Careful observance of, and advice upon all matters directly or indirectly affecting the welfare of the army horse, e. g., stable-management, forage, and feeding, watering, etc.

Prevention Better Than Cure

The policy of the army veterinary service is well expressed in the adage "prevention is better than cure." The importance of prevention in military matters is paramount, and herein veterinary medicine differs widely from human medical practice. This becomes apparent when one remembers that the horse cannot help himself but is entirely dependent upon the observation and foresight of those whose work it is to fend for him.

Veterinary and medical practice run side by side so far as hygiene, sanitation and antisepsis are concerned, but the point of divergence is where the man can report himself "sick" and the horse cannot. This means that if the horse is to be adequately protected he must be inspected at least once daily by someone who is competent to detect incipient symptoms of disease. It does not require much imagination to realize the enormous amount of work and organization involved in arranging for this service alone in connection with a military horse strength of many hundreds of thousands.

The difficulty in detecting the first symptoms of disease in a horse is considerable, and no small degree of experience is necessary before this difficulty can be overcome. This fact is particularly brought home to those concerned in dealing with outbreaks of equine influenza and pneumonia. In this class of disease, the greatest scourge of the equine race under conditions of domestication, frequently there is in the early stages little or no abnormal sympton apparent to the unskilled observer. A horse, to such, may appear in good health, although at the time a clinical thermometer will register a rise of 5° F. if the temperature of the animal be taken. It is hardly necessary to add that if taken out and worked in this condition, as only too often happens, the animals will subsequently either die or become so seriously ill as to necessitate several weeks of careful treatment.

Remounts, that is unseasoned horses, are peculiarly liable to this class of disease, so much so that practically every horse undergoes an attack subsequent to purchase and prior to commencing his military training. The army veterinary service took early steps to combat this potential cause of wastage by enforcing the rule that in no case was any remount to be embarked on a ship or transferred from a remount depot unless his temperature had been taken and found to be normal not later than the day immediately preceding the journey. This simple measure alone has probably saved the lives of thousands of horses. In addition to the above rule, instructions are that when an outbreak of pneumonia or influenza occurs in any unit no horse of the unit is to be worked on any day during the existence of the outbreak unless his temperature has been found normal.

Care of Horses on Board Ship

There is no branch of administration in which the army veterinary service has better justified its existence on economic grounds than in connection with the care of and arrangements for horses and mules on board ship.

At the outbreak of the war it became evident that a large number of horses and mules would have to be purchased in other countries and brought to England by sea, and the veterinary directorate at the war office undertook to provide veterinary surgeons to take charge of the animals during their voyage to this country. Veterinary surgeons were also sent out with the purchasing commission to examine the animals before purchase and to make such arrangements subsequently as would insure that only healthy animals were placed on board ship for conveyance to this country or elsewhere as might be required. One veterinary surgeon and a carefully selected lay assistant were allotted to each ship carrying horses or mules.

The appointment of an assistant, in addition to a veterinary surgeon, to each ship proved a fortunate arrangement, as it was found possible after a year's experience to place many of the assistants in sole charge of the animals, and to withdraw a corresponding number of veterinary surgeons for duty with divisions of the new armies at a time when the problem of securing sufficient veterinary officers for the latter was acute.

For purposes of convenience both veterinary surgeons and lay assistants when acting in sole charge of horses on board ship are called "conducting officers." These conducting officers have done invaluable work. Many of them have been continuously employed on horse-ships since October, 1914, and have become trained experts of the highest order.

During the first few months of the war the losses on board ship were somewhat heavy, averaging about three per cent for a short period. It is now rare to lose one per cent. Ship after ship ar-

rives in port after the voyage across the Atlantic with at most one or two animals lost on the voyage and often none. Even on the long sea route from Canada to Mediterranean theaters of war the loss has seldom amounted to one per cent. Including the above-mentioned heavy losses during the first few months of the war the total average loss on all horses and mules shipped from the beginning of operations to the present date barely exceeds one per cent. These excellent results are attributable in part to the pains taken to insure the animals being in good health when shipped: in part to the expert care bestowed on the animals on board ship; and in part to the improvements on horse-ships that have been carried out during the war as the result of suggestions and recommendations received from conducting officers. A notable improvement in this connection has been the adoption of a system whereby animals are shipped free in pens, each pen containing about five horses or mules. Formerly all army remounts were shipped in narrow stalls, each animal having a stall to itself of a maximum width of two feet six inches.

The pen gives more freedom of movement, better facility for sanitation and ventilation, and even permits an animal to lie down for a while.

Incidentally an important economy has been effected in that far less timber is required for constructing pens than stalls.

The foregoing is only one of the many problems that have been solved successfully as the outcome of keen and zealous observation and research on the part of conducting officers.

Service Not Devoid of Peril

Conducting duty during this war has naturally not been devoid of stirring and perilous incident. In July, 1915, the S. S. "Anglo-Californian," carrying 925 horses from Canada to England, was attacked off the coast of Ireland by a submarine. After three hours' shelling and the death of the captain the ship put into Queenstown in a leaky and battered condition. Of the 925 horses on board 26 were killed by shell fire. The remaining 899 were ultimately landed at an English port in good condition, owing to the gallant behavior of the civil veterinary surgeon, Mr. F. Neal, who, although he had every opportunity to leave in the ship's boats at the same time as the subordinate staff, remained at his post and tended the horses almost single-handed until the ship was conveyed into port. He also attended the wounded on board during the engagement. In recognition of these services, brought to notice by the admiralty, Mr. Neal was presented with the approval of the treasury, with a gold watch suitably inscribed to commemorate the occasion. This is but a single instance of numerous acts of heroism and devotion to duty on the part of conducting officers.

The following extract from the diary of Mr. A. E. Boyer, veterinary surgeon in charge of S. S. "Mechanician," who has acted with distinction as conducting officer since October, 1914, will give some idea of the nature and importance of this work. (See page 42.)

Work of A. V. C. at the Front

The work with divisions in the front line and field units and elsewhere is largely of a preventive and first-aid nature. In each division, in addition to the mobile veterinary section, there is a definite number of officers and non-commissioned officers, army veterinary corps, distributed as evenly as possible throughout the fighting units, just as are medical officers and non-commissioned officers of the R. A. M. C. These veterinary officers and non-commissioned officers are responsible for carrying out simple first-aid treatment and for deciding what cases are slight enough for "duty and dressing," and what should be handed over to the mobile veterinary section of the division for evacuation to veterinary hospitals on the lines of communication. They carry out the constant inspection of animals mentioned in the earlier portion of this article as being indispensable to prevention of diseases, both contagious and non-contagious, among animals. Relatively the number of bullet and shell casualties among horses and mules is small as compared with similar casualties among officers and men, because the animals are as far as possible kept behind the firing line.

In a big cavalry action naturally mat-

ters would be different, but this form of warfare on a big scale still is awaited so far as the British forces in this war are concerned. Horses fare better than men in so far as their thicker skin and bulkier tissues offer greater resistance to projectiles and splinters, but worse than men in that economic considerations and mechanical difficulties often render it necessary to destroy horses for wound conditions which would at most maim a man. Open wound dressing is necessarily for the most part practiced in the field. Bandaging is only practicable to a relatively small extent. Under the best conditions it has not on the whole been found a suitable form of dressing for the unclean type of wound met with in active service, and in the case of equines it is most difficult to apply a bandage to any situation other than the lower extremities of the limbs that will not speedily become displaced and thus become a positive evil instead of a hypothetical good. Certainly bandaging appeals strongly to the popular imagination. There is an effective cleanly appearance about a freshly bandaged wound which catches the eye of the journalistic artist and, through his efforts, that of the general public.

In point of actual results, however, it has been found better to disregard superficial appearances and to enlist the bactericidal aid of the oxygen of the atmosphere.

What is probably the best form of field dressing for horses discovered up to the present is as follows:

Foreign bodies are removed from the wound as far as possible without probing. Shreds of damaged tissues certain to die and decay if left *in situ* are similarly removed with the dressing scissors. The wound is then gently cleansed with antiseptic wool, facilities for downward drainage of discharge established, and the dressing completed by painting all exposed tissues with tincture of iodin.

It would not be permitted in an article of this kind to state fully how the personnel of the army veterinary corps is disposed throughout a division; suffice it to say plans are such that every animal may receive at all times the expert attention of this personnel. No horse is permitted to suffer unnecessarily. If it is evident that he cannot be restored to usefulness within a reasonable period, he is painlessly destroyed on the spot. If his injury or disease is amenable to treatment he is evacuated without delay to a base hospital containing facilities for the most up-to-date and scientific methods of treatment.

The mobile veterinary section is a complete veterinary unit, allotted to a division, corresponding in many ways with a field ambulance of the Royal Army Medical Corps. The duty of this unit is principally to collect from fighting formations in its divisional area all injured, sick and debilitated animals requiring to be sent back to the large veterinary hospitals on the lines of communication. It also acts as a dressing station and undertakes the collection from the base of veterinary medicines and equipment. These stores are then distributed by the section as required to divisional combatant units, a system which has proved far more convenient and expeditious than that in vogue in the earlier stages of the war when each unit in the field received its supplies independently from base depots of veterinary stores. Approximately half of the personnel of the mobile veterinary section is utilized in the duty of collection of sick and first-aid treatment, including injection when necessary of tetanus antitoxin; the other half forms what is known as the railway conducting party. This party is responsible for safe conveyance of the patients from the nearest available railroad to the veterinary hospital at the base and first-aid attendance enroute. On its return from the base the conducting party brings with it the medicines and equipment required for distribution to divisional units as mentioned above. Not all the patients collected by the mobile veterinary section are sent to the base; when the division is stationary milder cases are retained and treated by the section and ultimately returned cured to units.

Veterinary Hospitals and Convalescent Horse Depots

These are situated on the line of communication and at the various bases of the expeditionary forces, in addition to

many established in the home commands.

An overseas veterinary hospital is established to deal at one time with 1,250 cases or a greater number, its organization being such as to permit of ready expansion. The personnel allowed for each hospital is sufficient but not extravagant, having in view the important principle that an administrative service should be an economic dividend-paying proposition.

It is interesting to reflect that on mobilization, the then diminutive army veterinary corps was sufficiently hard put to it to find skilled subordinate personnel for one veterinary hospital as at present constituted; whereas there are now about thirty such, apart from camel hospitals and convalescent horse depots, all staffed with competent, highly trained personnel.

Each hospital is subdivided into wards and each ward so far as possible is appropriated to the treatment of a separate class of injury or disease. To the most skilled surgeons is given the care of wound cases; officers who have specialized in microscopic work have charge of the cases of parasitic skin disease and microbic affections. Similarly each noncommissioned officer has definite duties allotted to him according to the capacity he displays for a certain kind of work.

The treatment of parasitic skin disease alone presents an enormous problem. From earliest history parasitic skin disease has ever been the distressing accompaniment of war. Horses, like men, suffer from the depradations of lice, but a far worse scourge of the former is the disease known as mange.

Mange the Great Scourge

This disease, caused by a microscopic insect parasite which attacks the skin and in one species burrows under the surface of the skin, gives endless trouble. The intense irritation that occurs causes the affected horse to lose flesh rapidly unless promptly and efficiently treated. One veterinary hospital with the British Expeditionary Force is practically confined to the treatment of this disease alone. In the earlier part of the war each case had to be separately treated by hand, involving an enormous amount of labor but now there are established in many veterinary hospitals specially constructed dipping baths capable of dealing rapidly and easily with any number of patients. The bath is a long, trench-like affair, dug into the ground and lined with concreted material, impervious to water. The bath is filled up to a certain height with a solution or mixture of the medicaments found most efficacious in destruction of the mange parasite and kept by means of steam at precisely that temperature ascertained to be necessary for the best results in the treatment. Matters are so arranged that the horse on plunging into the bath is completely immersed in the solution, whence he emerges, having traversed the length of the bath, by an upward incline to the dripping pens.

The principal difficulty in regard to mange is to find a solution or mixture of medicaments that will destroy the parasite and its eggs without injuring the skin of the patient. Unless care is taken to observe both these conditions injury to the skin to a serious extent may supervene, so that the remedy proves "worse than the disease."

To eradicate mange entirely from an army in the field has so far proved impossible, but in this war it is kept well under control and has never got the upper hand, as it did in the South African War, 1899-1902, when it caused heavy mortality and inefficiency.

The great progress in methods of treatment of mange made by the army veterinary service in the present war is scientifically gratifying and economically important. It has in fact, as a disease, ceased to be a terror and now only remains a nuisance. In the British Expeditionary Force, 80 per cent of all cases of disease, including wounds, admitted to veterinary hospital are returned to duty in due course. Of the remaining 20 per cent, a considerable proportion are painlessly destroyed, and sold at a good price to the local inhabitants for human consumption. In this country the percentage returned to duty from veterinary hospitals is naturally higher in proportion as the conditions obtaining at home are more favorable than those nearer the firing line. The absolute

wastage, both overseas and at home, is thus kept down to a low monetary figure.

Each veterinary hospital is an entirely self-contained unit responsible not only for the treatment of 1,250 horses and mules, but for the discipline, training, payment, and general welfare of over 400 non-commissioned officers and men. Apart from medical and surgical treatment the horse and mule patients have to be fed, watered, groomed, shod, exercised, and generally cared for in such a way that they will be fit for duty at the front or elsewhere when discharged from the hospital. All animals thus discharged for duty are sent straight to remount depots where they are classified and posted again for service to various branches of the army as may be most suitable.

The selection of adequate sites for vetinary hospitals has been a difficult business. Apart from the large area required, questions of accessibility to railway stations, good water supply, facilities for disposal of manure and carcasses, called for serious consideration. A horse normally needs for drinking purposes alone about eight gallons of water a day in addition to the requirements for surgical and other purposes. In the opening months of the war the veterinary hospital was necessarily for the most part an open-air institution. Not at once could there spring into existence the present admirably constructed stables, operating sheds, shoeing forges, exercising tracks, store houses, and other carefully devised arrangements for the convenience and comfort of animals and men.

Covered Sheds Essential

Although it is true that horses tied up in the open will, if well fed and blanketed and provided with moderately mud-free standings, keep in good health and flesh, it is nevertheless impossible in the climatic conditions of Northern Europe to obtain the best results under these conditions so far as veterinary hospitals are concerned. Among reasons that contribute to the desirability of some sort of overhead cover for sick horses, there stands out prominently the fact that it is not reasonable, humanly speaking, to expect men to give to patients standing in the open in wet weather the individual care and attention which are essential to successful veterinary work. Moreover, during the winter months, at least, covered accommodation is absolutely necessary for the adequate treatment of mange which, as already stated, forms a constant and considerable proportion of equine patients in time of war. To deal efficiently with this disease it is necessary to clip the animals all over, to wash or "dress" them frequently, and to leave them unblanketed during the course of the treatment, as blankets harbor infection and facilitate spread of the malady. It is evident that grave loss of flesh and condition must occur if unclipped and recently "dressed" animals are exposed day and night to wintry weather while tethered and without protection or shelter of any kind. Condition is easily lost but hard and tedious to restore. A really emaciated animal takes many weeks and even months to recover sufficient muscular bulk to fit him for the heavy exertion of military duty at the front. The financial expenditure represented by covered accommodation for veterinary hospitals is therefore repaid in preservation of condition and consequently accelerated convalescence. In veterinary, as in most other matters, "time is money," as practically every horse delayed in the hospital has to be replaced in the unit whence he comes by a fit horse from a remount depot. Shelter and a moderate amount of warmth are great aids in the restoration of condition as well as in preventing the loss of it. Food must not only build up the tissues but must maintain the body temperature, and the more it is directed to the latter service the less there is available for the former. On a standard minimum food ration, therefore, it is important for body-building purposes to keep the patient warm.

Especially during the winter in France and Belgium, when the universal mud causes heavy strain on gun teams and transport animals by reason of the great difficulty in dragging vehicles over the shell-torn swampy ground, a constant stream of debilitated and war-worn horses and mules pours into the veterinary hospitals from divisions at the front. These animals for the most part are not

diseased but merely weakened through loss of muscular and other tissue. For such horses the comfortable surroundings and shelter of the hospital act like magic. Except in the case of old animals, in a comparatively short period the hollow sides fill out, the coat resumes its normal condition, and the returning strength and spirits give evidence of restored vitality. These results could not be attained in double the time were covered accommodation in winter not available.

Old animals, if debility is at all marked, recuperate slowly even under the best conditions, so slowly indeed that it is often economically necessary to destroy them rather than to keep them until again fit for work. This lack of resiliency in the old animal renders it most undesirable to purchase for war purposes any horse that has passed the prime of equine life. The period of a horse's life during which he is at his best for military purposes is very brief. If under six years of age he is highly susceptible to all forms of equine contagious disease and stands the hardship of a campaign badly. If over twelve years, although resistant to contagious disease, he has generally lost the elasticity and recuperative powers necessary to enable him to "pick up" quickly after a severe bout of work. Therefore, military veterinary hospitals receive an undue proportion of the old horses of an army, especially in the winter months. It would be ungracious to proceed to any description of the buildings of the veterinary hospitals without referring to the assistance afforded in this respect by the Royal Society for the Prevention of Cruelty to Animals. This admirably organized society has labored throughout the war to assist the army veterinary service in its efforts to promote the welfare of the army horses, and as a logical consequence the efficiency of the armies in the field. Naturally the objective of the society is humanitarianism, but the active practice of a genuine, if from a technical point of view, irrelevant, good inevitably leads to increased efficiency at some point or other. Benevolent societies like the R. S. P. C. A. and Y. M. C. A. whose objectives at first sight may appear widely removed are in effect working toward the same end—efficiency. Science, religion, secular benevolence, and philosophy, in so far as they are all striving for a positive good are aiming for the same goal, and their progress is limited only by the degree of truth on which their policy and activities are based.

Mallein Reduces Mortality

To describe fully the work done during the war by the army veterinary service in connection with the control of glanders alone would require much more space than this entire article.

Records of glanders date back to Hippocrates and Aristotle, and from earliest history it has caused important losses among horses in times of war. The reasons for its predominance in time of war are partly the same as those which cause most infectious diseases to multiply at such times, but notably a tendency to assume a virulent form when by reason of hardship or food shortage the constitutional bodily resistance of the animal is reduced. An outbreak of glanders occurring in peace among well-fed highly conditioned, otherwise healthy, animals spreads slowly and with difficulty, on account of the physiological resistance it encounters in war, on the other hand, an outbreak occurring among warworn or debilitated animals will speedly assume serious proportions unless adequate means are adopted to check it.

Mallein has been freely used in the present war with the result that the mortality from glanders has been less than 1 per cent of the total mortality from equine disease in general. Every remount is tested with mallein as soon as purchased. Animals arriving from Canada or elsewhere after purchase are again tested. In brief, the test is applied at every period in the animal's career found from past experience to be associated with an outbreak of glanders. Last, but not least, animals cast and destined to be sold are tested with mallein before sale so as to avoid the possible chance of transferring to the civilian community an infected horse that may develop acute glanders subsequent to sale and thus spread disease to the detriment of the

(*Continued on page* 259)

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Eradicate Scabies of the Horse

FOR three years British veterinary publications have been telling of the appalling loss among the horses of the allied armies due to mange. During the greater part of that time other British publications, those devoted to horse interests, publications of humane associations and societies and even the daily press have given much attention to this subject, publishing many accounts, doubtless in some instances exaggerated, of the suffering and loss of military horses from mange, and of the enormous toll from this ailment in suffering and in incapacitation of animals. The veterinary corps of the British army has come in for more criticism in this connection than in any and all other of its manifold activities.

This should have been a sufficient warning to us, but it wasn't. It is now painfully evident that this bitter experience of our European confreres made no more impression on the veterinary profession of America then the proverbial "water on a duck's back," and when our own government began shipping horses over seas we blithely sent them on their way to succumb under conditions abroad, to the ravages of this parasite, ravages that should have been foreseen and prevented.

Horses are expensive and none too plentiful, but of far graver importance is the scarcity of shipping facilities. It can be nothing less than a calamity to have to send two horses, and feed for two horses to Europe that one may serve our army while the other is in the hospital being treated for mange.

In civil life, mange in horses is a matter of little concern—its economic importance does not justify the expense of its eradication; this does not hold with army horses. Mange in cattle and to an even greater degree in sheep was a nuisance; it caused great losses to the cattle and sheep industries and we proceeded to eradicate it from great areas, even from semi-domesticated range animals. How much simpler is the problem as regards horses destined for military purposes over seas!

In Major Rainey's report published in this issue, he says that the eradication of mange from horses in an army in the field has so far proved impossible, but in this connection it must be remembered that it is the European way to fight animal plagues, the American way to eradicate them "root and branch." A British or a continental veterinarian is doing what is expected of him when he puts up an effective fight against animal plagues. American veterinary traditions are different—nothing short of eradication can be tolerated—see the history of foot-and-mouth disease in this country, of contagious pleuro-pneumonia, of scabies, of tick fever, of dourine, and what is coming to tuberculosis of cattle and swine. Further-

more, Major Merillat, who has seen more of this ailment than any other veterinarian with our expeditionary forces, states unhesitatingly and positively that eradication is practical, feasible and most necessary.

Whatever may be the chances of eradicating mange from among our horses in France, we must stop sending infected horses across. That offers no insurmountable or even considerable difficulty. Note what is being done in infinitely less urgent matters—tick eradication in a single state—200,000 cattle were dipped in Louisiana under federal supervision during last March alone, mainly voluntarily, for the state-wide law governing the work of tick-eradication did not become operative until April 1, 1918. More than 800 dipping vats were constructed during the month.

That mange among American army horses "over there" has already attained the proportions of a scourge is amply attested by almost every letter received from American veterinarians in France. To again quote from Major Merillat, "I have fought this demon (mange) so long now and so hard that I am beginning to look with great curiosity on any stray brute that is not branded with this war pest."

Much has already been done to ameliorate the condition, dipping vats have been constructed and are in use at many of the cantonments, and of course no animal visibly affected is shipped. But more comprehensive measures seem necessary; dipping all horses shipped abroad, a more thorough disinfection of boats, and greater care in railway and other transportation abroad, and if necessary a campaign for complete eradication throughout this country.

In France our veterinarians are combatting it effectively but no measures looking to complete eradication have been instituted.

Adequate plans for handling mange in our army horses, both at home and abroad, will probably have to emanate from Washington, and probably will be undertaken when the veterinary corps is somewhat more fully organized. In the meantime it is the duty of every veterinarian, whether in military, state or federal service, or in general practice, to inform himself fully and up-to-the-minute on the subject of scabies of horses.

There is probably no lack of opportunity for clinical study at this time. The oldest practitioners in Chicago cannot recall a time when mange was so prevalent in the city, and conditions at the market centers indicate that the condition is somewhat general.

IMPRISONMENT FOR DEALING IN TUBERCULOUS CATTLE

James Dorsey, the notorious dealer in tuberculous cattle of Gilbert and Elgin, Illinois, has at last run afoul of something more effective than state live-stock regulations or the department of agriculture regulation prohibiting the interstate shipment of diseased animals. It was the law against using the mails to defraud. The sentence of Judge Landis, in whose court Dorsey was tried and convicted was "eight years in the federal penitentary at Fort Leavenworth, and a fine of $3,000."

The story of James Dorsey's dealings in tuberculous cattle is a long one, and in the main, too familiar to most veterinarians, to need repeating.

Briefly, it may be said he began in a small way as a cattle dealer in the Elgin dairy district, and it was not until about ten years ago that the magnitude of his operations was such as to attract notice throughout the states to the West.

The absurd plan of tuberculin testing in effect in Wisconsin at that time, and the fact that Illinois had no law or regulation requiring that cattle shipped into the state should be free from tuberculosis, played into Dorsey's hands most effectively.

At that time, and for several years afterward, agricultural students, long course and short course, and it is said no course at all were supplied by the University, after some sort of a demonstration for examination, with a certificate to do tuberculin testing. These men went out, responsible to no one, and tested cattle. The "grape vine telegraph" promptly passed the word to Dorsey when any of these men were operating in a neighborhood, and as the

story goes he promptly appeared in such neighborhoods to buy cows, offering about half the market price. His purchases were shipped to his farms at Gilbert and reshipped to points throughout the middle West.

The business grew apace, until it is said that Dorsey's sales in one year amounted to 20,000 animals. Soon many of the states throughout the West were placing restrictions on the importation of cattle, requiring certificates showing that they had passed the tuberculin test. At first, Dorsey was able to supply the certificate from a number of reliable veterinarians in the district; but soon these men learned that when they issued a certificate of health for one bunch of cattle, the shipment was quite apt to be composed of entirely different individuals; in fact, it is stated that Dorsey retained a bunch of cattle including cows of every breed, color, age and description that were tested every week or so, in order to obtain certificate for the shipment of wholly different animals. In time the veterinarians about Elgin learned of this, and refused to do further testing for Dorsey.

At about this time, Dorsey made arrangements with Dr. Alex. Tyler of Elgin, to do all his testing, and out of this perhaps the greatest scandal, in the matter of tuberculin test, grew. At a trial of Tyler, before the Illinois State Board of Veterinary Examiners, it is reported that shippers said they had seen hundreds, perhaps thousands, of tuberculin test certificates signed in blank by Doctor Tyler, and evidence from several states was introduced showing that diseased animals in great numbers had been shipped on such certificates. As a result, Tyler's license to practice in Illinois was revoked, and he was expelled from the state veterinary association.

This traffic in tuberculous cattle resulted in a number of states offering the best market for Illinois cattle and refusing to honor a certificate of health issued by the state veterinarian of Illinois or any other veterinarian in the state. This condition was not corrected until some time after Dr. O. E. Dyson was appointed state veterinarian six years ago, and until after a civil service examination was instituted as a basis for the appointment of assistant state veterinarians. This attitude on the part of the live-stock authorities of Wyoming, which was the first state to take it, and of Iowa and Missouri and some other states, was most unjust. For while, perhaps, every state contained some veterinarians base enough to issue fraudulent tuberculin test certificates, the veterinarians of Illinois alone had the backbone to see that such traducers of the good name of the profession had their licenses to practice revoked, and were expelled from the association for it.

Mr. Dorsey made a huge fortune for a cattle dealer from his traffic in tuberculous animals. The $3,000 fine is as nothing to him, and if he cares to count it in that way he can figure that he has made a salary, for the period of his sojourn at Fort Leavenworth (if he ever gets there; his case has been appealed), equal to that of the president of the United States. The loss to the cattle industry of Iowa, Nebraska, Kansas, Missouri, and most of the states West, is incalculable. If he shipped only 10,000 instead of 20,000 animals in a year they probably would reach ultimately a thousand different farms and if half of the animals were tuberculous, but few of these farms would escape getting at least one diseased animal. A pretty effective seeding of tuberculosis.

A number of lessons may be adduced from the Dorsey episode—The folly of trusting any but qualified men to do tuberculin testing. The need for veterinarians to give some attention to the owners of the cattle they test if they would conserve their reputations, the ineffectiveness of most live stock sanitary regulations for preventing the introduction of tuberculosis in a state, the baneful effect of political influence on state and federal regulations for be it known that Dorsey was backed by a political organization that long rendered him immune to state or federal regulation and his undoing did not come until this organization guessed wrong in one campaign and its friends were swept from power in Springfield and Washington by the political landslide of 1912.

Army Veterinary Corps Miscellany

CORRESPONDENTS often mention that they see nothing in the daily press regarding the activities of the veterinary corps; that there are columns and pages about the doings of the medical corps, and they want to know why it is the public is told so little about the work of the thousand veterinarians now in the army.

We have no means of knowing the reason for this. One might assume that it is because the work of the veterinary corps, although essential, lacks something of the spectacular that pertains to the accomplishments of the medical corps. There is the further reason that the medical corps is larger than the veterinary corps, and perhaps contains many more effective self-advertisers. The further fact that the remount stations and the veterinary hospitals are located at a considerable distance from the center of the camps, and often in inaccessible places making it something of a hardship for an associated press reporter or a newpaper correspondent to reach them, may have something to do with it.

Perhaps because of his wide acquaintance and great number of friends in the profession and perhaps also because he formerly conducted our surgical department, we receive a great many inquiries as to the whereabouts of Major L. A. Merillat, and what he is doing.

As has been announced before, Major Merillat proceeded to France early last December with the staff officers of the Forty-first Division.

The restriction on letter-writing, by the officers abroad, even if the time at their disposal permitted it, renders it impossible to give any detailed information as to their whereabouts or their doings; and of course only a limited amount of information is given out by the War Department at Washington.

However, it may be said that Major Merillat proceeded at once upon landing in France to an advanced section on the line of communication, and is in charge of a splendidly equipped veterinary hospital in the danger zone. Probably his hospital is the best equipped that any army in any war has ever had. He has been there now four months. If he remains in the same zone two months longer he will be entitled to a "danger-zone chevron," a decoration much coveted by officers and men.

In this zone letter-writing is almost out of the question; the days are too short to do all there is to do, and the only illumination permitted at night is the moon and stars, and in the winter time these are seldom visible in "Sunny France." Rain, snow, fog and clouds are plentiful enough; sunlight and moonlight are only memories. But, after all, the execrable winter climate of northern France has its advantages: It gives the officers and men a just cause for "cussing," and, as is well known, the weather is about the best thing, and certainly the safest thing to criticise in war time.

Mange is the greatest problem with the American veterinarians who are with the expeditionary forces now. Much has been said concerning this elsewhere in this issue, and in the April issue. In addition there are quittors, and fistula and poll-evil of course, and wounds, and, as mentioned last month, a form of lymphangitis of unusual severity. Taken all in all, excepting for mange and perhaps lymphangitis, the problems that the veterinarians with the expeditionary forces are meeting do not differ much from those they have been accustomed to in civil practice. The work is harder; the hours are longer; the hardships greater; but none complain of that—not while they have the weather to complain about—and they wouldn't anyhow.

Remount Depot at Camp Grant Is Busy School

The remount depot at Camp Grant, Rockford, Ill., is a big plant. It covers ninety-six acres of ground upon which are located forty-five buildings. Since the opening of the remount depot more than 10,000 horses and mules have passed through the institution.

Blacksmith, packers', teamsters' and farriers' and stable sergeants' schools are maintained at this remount. These four schools are a part of the organization of the remount depot, which is commanded by Major Albert Kalb. About every three months classes are graduated from these schools and the graduates receive diplomas.

Since the remount depot was instituted at the camp last fall, two classes have been graduated from each of these institutions. These men, who have become proficient in their different special lines, are being prepared for future assignment with mounted commands of the new national army.

At the remount depot horses and mules are trained for army service. Wild horses from the western plains are given their first instruction in working beneath saddle and harness.

The remount depot has a base veterinary hospital equipped with convalescent pens and isolation sections. There are eight stables in the animal hospital which will accommodate 400 animals. Lieutenant G. A. Kritchfield of the veterinary corps is in charge.

RECENT APPOINTMENTS, PROMOTIONS AND ASSIGNMENTS

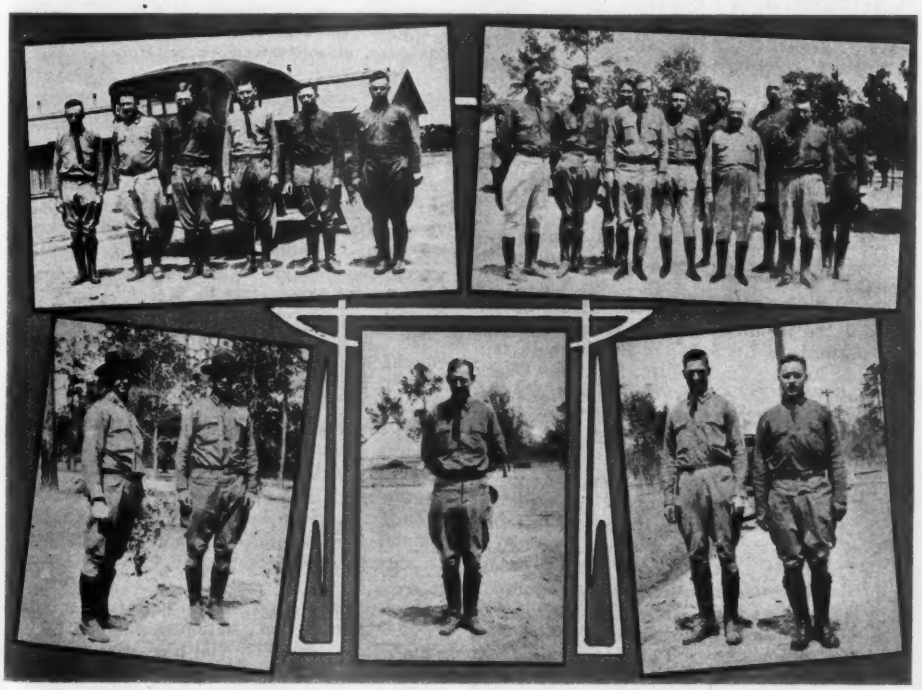
Majors

Gilliland, Maj., S. H., or commissioned asst., assigned to make six trips a month to Camps Meade and Dix.

Captains

Gwinner, 1st Lt. C. W.; Hodge, 1st Lt. J. E.; Dunn, 1st Lt. R. A., in N. A.; Connolly, 1st Lt. J. J., N. A.; Crouse, 1st Lt. J. W.; Weaver, 2d Lt. P. V.; Eakins, 1st Lt. H. S.; Cook, 1st Lt. C. E., made captains.

Little, Capt. J. T., to Aux Remount Depot 302, at Camp Upton, as veterinarian; Hickman, Capt. T. S., will report to Surg. Gen.



Upper left-hand: Veterinarians at Remount Depot, Camp Logan, Houston, Texas. Left to right, Capt. Fulston, Lieuts. Bennett, Henry, Martin, Bear and Archer. Upper right hand: Major Seeley's veterinary squad at Camp Logan. Lower left-hand: Lieuts. W. W. Richards and Geo. J. Rife, at Camp Logan. Lower center: Major Seeley, Division Veterinarian, Camp Logan, Houston, Texas. Lower right hand: Lieuts. Effner and Weisman, Camp Logan.

First Lieutenants

Moore, 1st Lt. J. D., N. A., to Camp Taylor; Jones, 2d Lt. R. B.; Gest, 1st Lt. J. F.; Stewart, 1st Lt. R. B., to Ft. Ethan Allen with 310 Cav.; Crosby, 1st Lt. J. F., to 1st F. A., and by letter to Cmdg. Gen., Southern Dept.; Casey, J. W.; Barr, A. C.; Booth, T. O.; Selby, O. C.

First Lieutenants: Arburua, J. M.; Black, W. G.; Ratigan, W. J., N. G.; and Selby, O. C. and Cooper, P. O. to Camp Greenleaf.

Melchiorsen, 2d Lt. W. G.; Hodge, 2d Lt. J. E.; Kelsey, 2d Lt. H. R.; Walker, 2d Lt. E. P.; Vail, 2d Lt. I. R.; Greenfell, 2d Lt., F. A., promoted to be a 1st Lts.

Martien, 1st Lt. H. D., to Camp Jackson with Aux. Remount Depot 315, as veterinarian; Buffin, 1st Lt. K. E., to Camp Merritt as meat inspector.

Second Lieutenants

The following 2nd Lts. are ordered to report to Dept Qm., at Chicago, as meat inspectors: Bittner, P. F.; Conroy, J. G.; Denton, R. D.; Flanagan, R. J.; Frank, H.; Hobson, E. E.; Hoylman, A. A.; Kallenberg, E. F.; Keyes, H. O.; Lynch, F. B.; McKibben, R. W.; Peterson, W. C.; Regan, J. J.; Riedel, P. H.; Sheff, W. R.; Shinn, F. W.; Stirrett, C. S.; Tweed, P. T.; Ward, T. V.; Wheat, J. C.; White, P. E.; Wright, C. C.

Hardy, 2d Lt. A. E., to Camp Taylor; Quigley, 2d Lt. R. M., to Camp Hancock; Stier, 2d Lt. L. L., to Camp Cody; Gale, 2d Lt. H. C., to Camp Funston; Calkins, 2d Lt. R., hon. discharged; Sisk, 2d Lt. D. E. and Snell, 2d Lt. N. D., to Camp Custer; Roomey, 2d Lt. J. J., Jr., to Aux Remount Depot 310 at Camp Sevier; McCulloch, 2d Lt. H. I., to Kansas City, Mo.; Martin, 2d Lt. J. J., to Camp Funston; Green, 2d Lt. F. B., to Admiral, Md., as meat inspector; Langford, 2d Lt. S. M., to Ft. Sill with 14th F. A., and to Cmdg. Gen., Southern Dept.; Fast, 2d Lt. O. A., to Front Royal, Va., remount depot; Allen, 2d Lt. E. S., to Camp Lee; Doty, 2d Lt. L. J.; McKahn, 2d Lt. W. R., and Williams, 2d Lt. W. T., to Ft. Bliss, with Aux. Remount Dept.; Kepp, 2d Lt. L. J., to Camp Forrest, as meat inspector; Ozenberger, 2d Lt. E. W., to Camp Lee, with Aux. Remount Depot; Taylor, 2d Lt. G. E. to Camp Meade; Hobbs, 2d Lt. H. L., hon. discharged; Goodwin, 2nd. Lt. P. W. to Camp Wadsworth; Foster, 2d Lt. L. E., to Camp Hancock.

The following to Camp Greenleaf for further instructions: Gilman, H.; Mallette, L. B.; Williams, E. J.; Brown, M. M.; Martindale, E. C.; Albright, A.; Axten, E. B.; Barnes, C. F.; Bigelow, F. C.; Bryan, E. J.; Boxmeyer, R. E.; Burns, J. R.; Conti, L. F.; Couch, O. J.; Gibson, S. S.; Gray, J. W.; Griffith, B.; Hollis, J. E.; Johnson, P. E.; Longley, O. A.; Lang E. E.; McIlree, J. R.; MacLaughlin, C. W.; Mack, J. P.; Martin, F. G.; Miles, J. V.; Moore, B. A.; Griffith, B.; Hollis, J. E.; Johnson, P. E.; Cates, R. W.; Duttlinger, F. C.; Hartke, G. B.; McConnell, F. M.; Moseley, J. L.; Riggs, O. A.; Phelps, G. J.; Whitaker, R. L.; Kaufman, I. H.; Shultz, G.; Nelson, F. M.; Nichols, J. D.; Oliver, E. J. B.; Overzabal, J. L. D.; Pitts, H. E.; Purdy, M. J.; Ray, L. E. C.; Reedy, J. C.; Lefler, N. N.; Ruby, A. N.; Schaffer, G. R.; Scott, T. W.; Sebright, M. R.; Shaw, J. M.; Smith, O. A.; Snyder, E. J.; Snyder, W. A.; Teie, J. A.; Ury, C. L.; Weinberg, H. H.; Whitney, G. E.; Word, N. E.; Wood, P. E.; Warner, E. S.; Clark, G. A.; Fuller, M. P.; Leighty, W. R.; McCormack, C. D.; Page, J. W.; Whipple, R. O.; Hutton, A. G.; Butler, H. C.; Milman, M. H.; Stryker, L. H.

Lieutenant Lester H. Stryker, V. R. C., who has been stationed at Camp Lee, Petersburg, Va., has been transferred to the department for the purchase of animals.

Dr. M. Hanson, Broken Bow, Neb., who has been in the veterinary relief corps, has been honorably discharged, on account of varicose veins, contracted before entering service.

Dr. Malcolm Alexander, Zumbrota, Minn., has received a commission as second lieutenant, and assigned to Ft. Oglethorpe, Ga.

Dr. E. S. Carter, Pattonsburg, Mo., has received a commission as second lieutenant, and has reported for duty at Ft. Keogh, Mont.

Dr. Clarence Gerber, Stillwater, Minn., has entered the pharmacists' department in the veterinary service, at Ft. Oglethorpe, Ga.

Dr. Frederick A. Grenfell was made a first lieutenant in the veterinary corps, at Camp Grant, Rockford, Ill.

Dr. C. M. Heth, Lone Rock, Wis., has been commissioned second lieutenant, and assigned to duty at Ft. Oglethorpe, Ga.

Second Lieutenant Clarence Carnahan, of Grand Junction, Cal., stationed at Camp Fremont, Palo Alto, Cal., has been promoted to a first lieutenancy.

First Lieutenant Ivan C. Howe, 61st United States Infantry, received his commission January 9, 1918.

Department of Live Stock Poisoning

By L. H. PAMMEL, Ph. D., Ames, Iowa
Professor of Botany, Iowa State College

Moldy Ensilage Poisons Lambs

MR. Barns Bryam of Chariton, Lucas County, Iowa, sent some specimens of moldy silage and the following account of poisoning:

"These 320 western lambs were purchased at Omaha in the fall and ran on grass till December, when they were turned into a corn-stalk field containing considerable corn and put on grain feed.

"They had been on this feed about three weeks which consisted of three-fourths pound of ensilage, plus one-fourth pound cracked corn per head at night, and three-fourths pound of silage and one-fourth pound of oats and one-fourth pound of oil meal per head in the morning, when one lamb was noticed in the morning which did not come to eat, but stood away by himself with his head down. He had been eating very heartily so was probably getting a little more than the above rations. No medicine of any kind was given him and about ten o'clock he died. A little foam ran from his mouth.

"A postmortem examination held immediately showed that the lining in the stomach was loose in places and could be scraped off. Judging from this and from the fact that some moldy pieces of ensilage were found in the feed troughs which were accidentally fed from a spot of blue mold in the silo, we concluded that he must have been poisoned. No other sheep were affected and they eat and seem to thrive well on the good ensilage."

The silage sent to me was very moldy, chiefly *Aspergillus glaucus*. There was also some white mold (*Fusarium*). This common blue green mold is not regarded as poisonous, although some authorities claim it causes mycotic stomatitis. The symptoms as described are: an inability to graze, saliva dribbling from the mouth, and frequent visitations to the watering trough, holding the mouth in the water as though it were burned. The animals appear to be hungry but cannot eat. The mouth is red, and lips, gums and tongue swell. Blisters form and these soon give way to ulcers that may remain distinct or run together. In some of the aggravated forms the ulcers may unite so that when the crust comes off it will form a cast of the lip or the whole end of the tongue. The crusts are usually from the size of a dime to that of a quarter. The tongue may swell to such an extent as to protrude from the mouth, and the animal be unable to draw it inside. The muzzle may be increased one-half in size.

This mold, if poisonous at all, must produce a toxin, as has been recorded for a few of the molds related to *Aspergillus*. I am inclined to think that some other toxin was produced in the moldy silage. It is certain that moldy silage should not be fed to sheep.

Citric and Oxalic Acids Produced by Aspergillus Niger

The American Journal of Pharmacy[1] publishes a note taken from the *Journal of the Society of Chemical Industry*, stating that the black mold *Aspergillus (A. niger)*, which is sometimes regarded as mildly pathogenic, produces from nil to fifty per cent of citric acid. When the cultures are judiciously chosen, conditions especially favorable for the production of citric acid are low nitrogen supply, high concentration of sugar and the use of ammonium salts instead of nitrates. "In a proper fermentation

[1]Am. Jour. Pharmacy, 90:47-48.

the fungus does not produce spores, but remains white; under favorable conditions, the acidity will reach 10 to 12 per cent on the eighth day; oxalic acid may amount to 3 to 4 per cent." Attention may be called to the formation of oxalic acid in the process of fermentation. Oxalic acid is undoubtedly toxic under some conditions.

Influence of the Age of an Organism in Maintaining Its Acid-base Equilibrium

William de B. MacNider in a recent number of *Science*[1] discusses the importance of the maintenance on the part of the blood and tissue juices of a hydrogen ion concentration and its relation to the toxic action of some substances. He says: "Recent investigations have not only served to emphasize the importance that the organism should maintain a certain acid base equilibrium for its physiological life, but have also shown that when the mechanism which regulates this equilibrium is interfered with so that the hydrogen ion concentration of the blood is increased and maintained for an adequate time, the organism no longer functionates normally, but becomes pathological in certain of its reactions.

"Some years ago, while conducting a series of experiments in which uranium nitrate was employed as the toxic agent to induce an acute nephritis, the observation was made that this substance was more toxic for old animals than for young ones. This variation was expressed by the older animals becoming both albuminuric and glycosuric at an earlier period following the use of uranium than was the case with the young animals. Furthermore, the quantitative output in the urine of both albumin and glucose was greater in the old animals than in the young. When the kidneys of these animals were studied histologically there was found to exist more evidence of kidney injury in the organs from old animals than in those from young ones. In so far as the kidney was concerned in the reaction, uranium was more toxic in an old animal than in a young one.

"From the experiments which have been cited it would appear that there is a definite association between the toxic effect of uranium and its ability to induce an acid intoxication and that the age of the animal very largely determines the rapidity of development and the severity of this intoxication."

[1]Science, N. S. 46:643-645.

Common Bracken Poisonous Acidosis

In the March, 1917, issue of this Journal, Drs. Hadwen and Bruce[2] appeared a note on the "Common Bracken as a Poisonous Plant," to which I added a few comments. The authors now publish the results of their investigation. They conclude it must be added to the poisonous plants: "While up to the present we have not had any satisfactory analysis made, the physiological experiments cannot be gainsaid, and further, we drew attention to the fact that on all farms visited by us where the disease existed, bracken was present in the hay.

"That the toxic principle is insoluble in water has been established, as in addition to the feeding experiments already mentioned, a watery extract was prepared and administered to a horse, twice a day, for some sixty-four days. This extract was concentrated until one cubic centimeter was approximately equivalent to one gram of the dried fern. The usual daily dose was 2000 cc., but one day as high as 5500 cc. was administered. In all, the animal received the equivalent of about 290 pounds of fern, during which time he was only fed clean hay and was allowed no exercise. No symptoms of bracken poisoning were noted, notwithstanding the fact that this animal had consumed, in the form of an extract, 100 pounds more than the amount of dried fern necessary to kill experimental horse No. 3."

"Symptoms.—Usually the first indication of trouble noticed by the owner is an unsteady gait upon taking the animal out to water. The appetite is usually good. Animal inclined to constipation; eye congested; flanks tucked up. Nervousness. In the later stages if the head is raised the horse may fall. Stands with the legs spread and has a

[2]Dept. of Agriculture, Canada Health of Animals Branch, Bull. Scientific Series, 26: 1-15, f. 1-4.

distinctly intoxicated look. Greedy horses are most liable to attack."

Acidosis

Professor E. W. Murphey, in an address on "Agricultural Education" lays stress on a properly balanced ration to maintain the health of animals. He points out that in the eagerness to destroy the micro-organism which causes diseases, there has been a neglect of the study of the principles underlying the strength of the natural protective forces of the body. The vitamines are important in a study of the health of an animal. The vitamines in the body of phosphorous is intimately associated with an adequate supply of calcium in the food. He states that the "glycero phosphate of lime" is a short anchor. Australian soils are noted for their low phosphatic content, "and necessarily the grass is in keeping with it, and such is indicated by the prevalence of the bone-chewing habit among stock," a constant factor in the disease known as bush sickness in New Zealand, cribbles in New South Wales. In this disease there is always a low supply of P_2O_5, usually, but not always, there is a low supply of lime. He says: "Malnutrition of the nerves and fungus poisoning seemed to nearly explain it, but not quite. The knowledge of the vitamines, which I gained from Tibble's book, 1914, was another gain, but the chain was not complete until Mr. Scott, the government analyst, gave me Forbes' work on "Acidosis." I have never seen any references in Victorian literature to the necessity of the neutralizing of nonoxidisable inorganic acids in the blood, and had not realized that the disturbance of the equilibrium of salts of the blood-plasma could so affect the efficiency of the blood in carrying carbon-dioxide from the tissues to the lungs as to cause death. Such deaths do occur here on rich but sour pastures, and many thousands of head of stock have died from a degree of auto-intoxication in conjunction with the ingestion of toxic material. The want of alkalies and the ingestion of poisons proved too much. The details of the linking of practical experience with science on this question are set out in the accompanying article on "The Carry-in Capacity," and I venture the statement that a careful consideration of the subject will give considerable help toward a clear understanding of the causes of many of the chronic disorders with which people and especially mothers and children are afflicted.

The matter suggested by Professor Murphey is of great interest. In a letter to me he says: "It is interesting for me to note that Sir Arnold Theiler is of the opinion that their troubles are due to eating sour grasses, i. e., accumulations of toxins in the body, but the very amazing thing is that he, as well as the gent here ignore Forbe's Bulletin 201 and 207 in regard to the minerals and elimination. 'Agriculture and Life' Cromwell's book edited by Kary C. Davis, of Tennessee, 1915, is great. He says: 'A soil wanting in even one element of fertility produces a growth peculiarly susceptible to disease.' That is a most important statement, the animal is affected likewise. Forbe's work is of tremendous significance to pastoral interests in Australia, and I cannot get anyone to take any notice.

"Africa had Pro Hadin's advice. He said sacrosporidia just as Place of Adelaide says regarding the terrific mortality of fat sheep here that a parasite off the grass gets into the blood" he says.

"Spread and damage by parasite is made possible by acid conditions and low resistance due to malnutrition of both plant and animal."

Physiological Action of Cordyceps

J. F. Breuster and C. L. Alsberg have made a study of the physiological action of *Cordyceps sinensis*, a fungus parasitic on a caterpillar and related to ergot. The Chinese believe it to be a very effective drug. The aqueous extract of the fungus (1 gram of the fungus) injected intravenously into a rabbit proved fatal in one case in an hour and a quarter, and in another in three hours and a quarter. When this fungous material was heated with water and alcohol, it apparently had no effect, as the animals survived and showed no symptoms. Aqueous extract showed no hemolytic action.

EFFICACY OF SOME ANTHELMINTICS

(*Continued from page* 212)

writer of petroleum benzin, U. S. P. This product, distilled between 45° and 60° C., represents only the most volatile hydrocarbons of petroleum and is probably more like the commercial gasoline used by Stiles (1901) than the present-day commercial product.

Two full-grown sheep were starved for 24 hours and then given 15 mils of petroleum benzin in 150 mils of milk, on three consecutive days. They were drenched through a tube held in the mouth. In no case were any symptoms of intoxication from the fumes of the benzin observed during or after its administration, and the postmortem showed no lesions which could be attributed to the action of the drug.

Conclusion: Petroleum benzin showed marked superiority over commercial gasoline as an anthelmintic both for stomach worms and hookworms. While it did not quite equal the treatment with the copper-sulphate drench as a remedy for stomach worms, it was far superior to anything else tried as a remedy for hookworms and is worthy of further experimentation to test its efficacy on more heavily infested animals. For the treatment of stomach worms copper sulphate must still be considered superior, not only because it is somewhat more efficacious but on account of its lesser cost and the fact that only one dose of copper sulphate is required, whereas three doses of petroleum benzin are advisable.

Pelletierine Tannate

Cats.—Two cats weighing approximately 3 and 4 kilos each, were given 65 mgm. of pelletierine tannate per kilo each in capsules, followed one hour later by 25 mils of castor oil. Prior to the administration of the anthelmintic the cats were starved for 24 hours. They were fed shortly after the administration of the castor oil.

Conclusion: In the experiment pelletierine tannate proved unsuccessful as an anthelmintic for species of Taenia, Dipylidium, or ascarids in cats. The complete failure of the drug is not easy to understand. In the case of Cat 2 the drug might have been expelled in the vomitus before it had acted on the Taenia, but this is unlikely, since the vomiting did not occur until more than an hour after giving the drug.

Dogs.—The drug was administered to three dogs weighing from 11.8 to 14 kilos, at the rate of 16 mgm. per kilo and was followed one hour later by castor oil. Previous to the treatment 35 mils of castor oil were given to each dog as a preliminary purgative, and the animals were then fasted for 24 hours.

Conclusion: Pelletierine tannate apparently proved entirely inefficacious against *Dipylidium caninum* or intestinal nematodes in dogs, since none of these parasites was found in the feces, but some were present postmortem. As there is a strong probability that all feces were not collected, the writers can not be certain these results are conclusive.

Interior of double monster autopsied by Dr. J. D. Polk, Lebanon, Kentucky. The two hearts may be plainly seen.

Pointed Opinions on Live Topics by Readers of Veterinary Medicine

It is in reports like those of this department that the current history of the progress of veterinary science is written. Are you leaving a record of your experience which will help others, as you have been aided by these and other clinical reports? If not, you are earnestly invited to contribute from your experience that this department may be of the greatest service to its readers. By so doing you will earn the lasting gratitude of those who are aided by your suggestions.

Sclerostomum Thrombosis of the Anterior Mesenteric Artery

THERE appeared in the March issue of the Journal an article from a subscriber entitled, "More about Cecal Stasis." Of the five illustrative cases cited three refer to the large colon, one to the stomach and one to the jejunum more particularly, with the synchronous observation of sclerostomes in the double colon. Of all five cases, since none deal specifically with the cecum, may I ask the subscriber if the word "cecal" in the title is advisedly used?

He says in part, "I am reporting herewith five cases that have come under my notice during the past four months, and I firmly believe if more attention were given to the circulatory system in these fatal cases of indigestion the results would be a revelation to many practitioners.

"I have just begun the practice of medicine during the past four months, having spent nine years as a veterinary inspector in the B. A. I., and during that time learned pretty well the art of making a postmortem examination, and when I have a fatal case I go for the cause."

The spirit to investigate the cause of death of fatal cases by postmortem examination is most commendable and tends to make the physician a better diagnostician and safer therapist. It is a practice more frequently being demanded by the clientele and more commonly performed by the veterinarian. It demands a thorough knowledge of postmortem pathology and postmorten technic.

As I am particularly interested in postmorten technic and postmortem pathology, I wish to correct the impression made by Subscriber that thrombosis of the anterior mesenteric artery is responsible for as many pathological changes in the digestive system as he believes he has shown.

I have thoroughly autopsied on an average of two hundred horses a year for several years and find that from 90 to 95 per cent of all horses have sclerostomes in the cecum and large colon and thrombi due to embryos of the sclerostomum bidentatum in the anterior mesenteric artery. In only one case was I ever able to prove that the thrombus was responsible for the animal's death. The thrombus may be as large as a child's head and induce a petrified arteritis without any disturbance of digestion. Thrombo-embolic colic is one of the rarest conditions affecting the horse. The clinician who diagnoses the condition cannot prove it if the animal lives, and if it dies he must at autopsy prove the presence of a thrombus or embolus with subsequent infarction of the mesentery and intestine.

In Case 1, Subscriber describes the large colon distended with gas but does not give the time nor date of autopsy in order that a reader may know whether the colic tympany was of antemortem or postmortem development. No anemic or hemorrhagic infarct of the mesentery or colon is mentioned, therefore, no evi-

dence is presented which could possibly place the responsibility for colic tympany on the thrombus in the mesenteric artery.

In Case 2, no time or date of death or autopsy is given as a guide for distinguishing between pathologic and postmortem changes. The portion of jejunum is not adequately described so that one might judge whether it was discolored by the active hyperemia of an acute inflammation, passive congestion due to strangulation during volvulus, or incarcerated internal enterocele or from hypostosis or postmortem hemoglobinous inhibition. No emboli or infarction are described, therefore the thrombus in the anterior mesenteric artery cannot be accused.

Case 3 is described as showing the large colon distended with gas. General paralysis is explained as probably due to an embolus finding its way to the central nervous system, although the head was not autopsied. It is absolutely illogical to draw conclusions as to the cause of one condition based upon the probable presence of some lesion in another part of the body which one has not autopsied. Furthermore, an embolus derived from a thrombus in the anterior mesenteric artery will be carried by the blood stream toward some portion of the intestine. It could not travel against the blood stream in the posterior aorta to the common aorta and then by the anterior aorta and its branches to the head. Neither could it pass down the mesenteric artery and through the portal venous system, because emboli cannot pass from the arterial to the venous system through the capillary system, and even if that were possible an embolus would be filtered out in the liver or lungs.

Explanation for paralysis should have been sought in the posterior aorta, the gluteal and psoas muscles, the spinal canal, and the bones of the part, none of which were described. No infarction was mentioned and thrombosis of the anterior mesenteric artery could not possibly have been responsible.

In Case 4, Subscriber explains a rupture of the stomach due to thrombosis of the anterior mesenteric artery. He says in part "Thrombosis of the anterior mesenteric artery, several sclerostomes in the thrombi. In this case I was unable to trace the branches of the artery, but I am quite certain the gastric artery was the one involved." Subscriber did not find a thrombus in the gastric artery and mentions no infarction. Therefore, he presents no basis for certainty that the "gastric artery was the one involved." Furthermore, the gastric artery is not a branch of the mesenteric arteries but is a division of the colic artery which practically never suffers from helminthic thrombosis. He says further, "I explain the rupture as being due to the fact that no inconvenience was caused till the organ became distended almost to the point of bursting, and then only a drink of water and the exertion of lying down or getting up would rupture the organ." Continued fermentation of gastric contents, retrogressive peristalsis of the small intestines, contraction of the stomach walls in an attempt to vomit, and other conditions may induce rupture of the stomach. Subscriber's statement concerning a drink of water as an etiological factor in rupture of the stomach is not substantiated. Thrombosis of the anterior mesenteric artery in this case is certainly not responsible for rupture of the stomach.

In Case 5 the colon is described as nearly twice its normal size; sclerostomes in the colon and worm thrombus in the anterior mesenteric artery. No time nor date of the autopsy is given to let the reader know whether it was antemortem or postmortem colic tympany. No infarction of mesentery or intestinal walls described. No ambolus revealed. Nothing described which could possibly fasten the responsibility of colic tympany upon thrombosis of the anterior mesenteric artery.

Referring to a case of rupture of the colon Subscriber says, "On postmortem I found a thrombosis of the colic branch of the mesenteric artery. After finding the thrombi, the rest was easy to explain, as the blood supply to that organ had been restricted for a long time and caused the symptoms of indigestion to appear." This does not tally with my postmortem findings. I have autopsied three horses in which thrombus was found in the anterior mesenteric artery

as large as a human head inducing aneurysmal ossified arteritis. These animals had never manifested any symptoms of digestive trouble during life and at autopsy presented absolutely normal digestive systems.

While it is illogical to attempt to diagnose the five cases from the descriptions given, it might be suggested that a closer study of the current textbooks on etiology of gastrectasia, antemortem and postmortem rupture of the stomach, volvulus of the small intestines, and tympany of the large colon would remove a great responsibility from that very common and unoffending thrombus of the anterior mesenteric artery.

I wish to take this opportunity to disagree with the authors of the current textbooks on veterinary medicine and pathology with reference to the pathogenesis of the thrombus in the anterior mesenteric artery of the horse. The idea that the embryos of the sclerostomum bidentatum pass through the mucous membrane of the cecum or colon, enter the mesenteric vein, pass to the portal vein, liver, through the liver to the hepatic vein, posterior vena cava, right side of the heart, lungs, through the capillaries of the lungs into the pulmonary veins, enter the left side of the heart, aorta and then pass backward and lodge on the intima of the anterior mesenteric artery only, and there form a thrombus is absurd. If they passed through the lungs and gained the aorta they would be found in many other branches of the aorta where they are never found. Living or dead embryos as emboli would be found in the kidneys and intermuscular tissue spleen and many other places including points reached by branches of the anterior aorta. At the autopsy table of the University of Pennsylvania Veterinary School, I have demonstrated the embryos of sclerostomum bidentatum in the walls of the anterior mesenteric artery at various points between its origin at the aorta and its termination at the intestines and microscopically shown them to be located in the vasa vasora of the anterior mesenteric artery, proving that the embryo enter the vasa vasora at the intestinal end and pass upward in the walls of the anterior mesenteric artery, then turn inward raising up the endotheliol cells, forming a rough surface where a thrombus forms. When a worm thrombus is found in the renal artery or posterior branches of the aorta it is due to extension of the large thrombus in the anterior mesenteric artery extending into the lumen of the aorta giving off emboli which produces secondary thrombi in the vessels named. This work fully corroborates the view of Stier (*Arch. fur Wissenchaftliche und Praktische Tierheilkunde*, May, 1913).

Philadelphia, Pa. W. J. CROCKER.

THE EDUCATED EMPIRIC

The article published in the March Journal under the title, "Conservation of Veterinary Practice," by Dr. E. R. Steel, is deserving of wide publicity in country newspapers. Veterinarians would do well to submit articles along that line to their local papers. Excerpts from Doctor Steele's article could be utilized for that purpose, by the busy practitioner. I am satisfied the Doctor would have no objections.

In this way the matter could be brought directly to the attention of the farmer and stockman who is the one to be educated. It would be useless to undertake the education of this particular brand of county advisors. Some perfectly good university spent four long years along that line and produced a failure.

A certain amount of education is necessary before a man realizes how little he knows; some require more education than others to bring them to a realization of this fact, as is proven by the veterinary activities of some advisors.

A four-year course in agriculture at any of our state universities should be sufficient to impress one as to his limitations, but it certainly is not in every case.

Example: Two men who should have absorbed a certain amount of intelligence due to environment, if nothing else, one a county advisor, the other a druggist. The druggist runs this advertisement in a local paper: "The tablets recommended by the county advisor for hog cholera are now on sale at the city drug store."

Taking in a lot of territory, isn't it? This man should not be limited to one insignificant county; his limitations should be four stone walls with one druggist for company.

The limitations for medical research of these two educated fools would be boundless if they were placed in a position where they could devote all of their time to such work. It is a question in my mind if the wording of the advertisement does not entitle them to such a position.

Instances similar to this are, no doubt, prevalent in many localities and veterinarians should not hesitate to give such statements the publicity they deserve through the local papers. My impression is that if you can think of anything applicable to such men which Doctor Steel has omitted he would be pleased to have you add it, as it was an oversight on his part.

I have no ax to grind, as we have no county advisor in McDonough county, but I have come in contact with some of their veterinary activities in adjoining counties. We are in need of a good advisor, one who will co-operate with the fine graduate veterinarians located in the county, in the conservation of food and meat, thus doing our bit to beat the kaiser.

Colchester, Ill. L. C. HULL.

GOOD CARE KILLS SHEEP?

It is well known that the best bred and fattest calves are the ones that usually die of blackleg. It is a familiar fact to all practicing veterinarians that horses that have been kept idle and on full feed are the ones most likely to be affected with azoturia, and furthermore, that horses and mules which are kept on full feed when given a temporary rest from their work are subject to lymphangitis and azoturia.

Now comes a disease of sheep which is apparently due to over-nourishment. During the months of January and February, almost every year, my office is besieged with letters asking for instructions on the treatment of sheep. Invariably, the disease described appears among ewes that are about due to lamb. The disease described does not appear in any flock of sheep except those that are well fed. In every case where the kinds of food given are enumerated we find that a liberal ration of grain has been used. Frequently, the letter states that the fattest and best ewes in the flock are affected.

These ewes at first fall behind the flock, there is loss of appetite, head down and ears drooped, a nervous movement of the head and ears, apparent blindness, the head is turned to one side or raised high and there is a grinding of the teeth. In from one to three or four days the sheep goes down and is unable to rise. It seems that the fattest ewes go down the quickest and that those carrying a little less fat may stand up as long as four days. After going down they have nervous spasms lasting for one or two minutes, after which the sheep rests quietly. The disease is uniformly fatal from a few hours to a day or two after the sheep goes down.

Only limited postmortem changes can be noted. Dr. D. Mike Howard of Appleton City describes the gall-bladder as being greatly distended and filled with a yellowish colored gall and the liver a pale yellow. Of course, we always expect from one to three lambs *in utero*.

I do not know a better name for this disease than pre-parturient eclampsia. It seems to be due to some nervous reflex action to which over-fat ewes in advanced pregnancy are peculiarly susceptible.

Unless promptly administered on the very onset of the disease no treatment is likely to be of much benefit. If given in time, four ounces of Epsom salt in a pint of lukewarm water or some other depletive treatment may relieve the symptoms.

Those who are not accustomed to treating sheep should bear in mind that drenching a sheep is a delicate matter. The sheep should be stood squarely on all four feet. An attendant standing astride the sheep should hold it by its cheeks and raise its nose just enough to cause it to swallow. The drench should be administered out of a long, slim necked bottle. A still safer plan is to introduce a rubber tube some distance down in the esophagus and pour the solution through

this tube by means of a funnel in the outer end. Under no condition should a sheep be laid on its side or back or pulled up on its hind feet for drenching.

Prevention consists in sharply cutting down the feed. Especially the ewes that are the fattest and the easiest to keep should be sorted out and put on very light ration. A laxative diet of bran mash or linseed oil meal is indicated, but should be given lightly. All sheep breeders who are inclined to give their sheep extra good care and plenty of feed should be advised, beginning about January 1st, to cut down the feed of any ewes which are taking on too much fat.

I should like to read, through the columns of the Journal, whether or not this trouble has been noticed to any great extent in any other states.

D. F. LUCKEY,
State Veterinarian.
Jefferson City, Missouri.

THE PENDULUM SWINGS BACK

Before me is the last word on the newer antiseptics, a "Handbook of Antiseptics" by Dakin and Dunham. By it one can see at a glance just how much healthier for our best friends, the pyogenic family, one antiseptic is than another. There is nothing like statistics to prove any case in hand or to fill a little book, but after all there is less real instruction in statistics than there is in practical use in the field when it comes to antiseptics.

My fondness for experimenting with antiseptics is not of recent date and it makes me very skeptical regarding the ability of the laboratory to demonstrate the real use of any antiseptic in general field work. There is no denying the fact that the so-called Dakin solution is one of the greatest things ever produced for wound cleansing and irrigation of infected parts. Like America, it appears to have been discovered twice, for in 1835 an apothecary in Paris—Labarraque by name—made famous his solution of chlorinated lime and soda which has existed to the present day under the name of Labarraque's solution. The exact difference between the two products is as follows: Dakin's solution is made from 400 grams of washing soda dissolved in 10 liters of tap water to which 200 grams of chloride of lime is added. The mixture is shaken, allowed to settle and the supernatant fluid filtered or strained through cotton, and 40 grains of boric acid added. Labarraque's solution consisted of 12 ounces of chlorid of lime rubbed in water and allowed to stand twenty-four hours, then decanted and strained. To this he added 20 ounces of washing soda dissolved in warm water and to this mixture was added water to make one gallon.

One does not need to do any research work to see that while Dr. Dakin has made the solution a neutral one and added a little boric acid which is excellent; as it does away with the slight irritation to the skin that sometimes followed the use of the older formula, to all intents he is perpetrating upon an unsuspecting world our old friend Labarraque in camouflage. Far be it from me to throw a verbal stone into the war garden of Dr. Dakin's fame but it seems to me that it would have been rendering unto Caesar the things that are Caesar's if he had called the new antiseptic "Labarraques improved;" or if he felt entitled to some of the honor he could at least have called it "Labarra Dakasol," thereby allowing the honorable dead his 50-50.

The veterinary profession has been the principal user of this peculiar and useful antiseptic. I recall a speech in which Dr. Archibald said, "I make a barrel of Labarraque's solution and use it for cleaning everything. It removes the dirt and grease from everything and cleans up as it goes." The one great secret of its success is it cleanses. Many theoretical objections can be raised as to the real value of this solution after exposure to air for some time. The laboratory will tell you quickly about the available chlorin and the exact strength of the product, but they cannot pass the bald fact that the last gallon in even quite an old barrel will cleanse a cage from distemper so that the next tenant that comes in with a broken leg will not die of pneumonia.

The cheapness, the ease and rapidity with which these solutions can be made and their sterling worth in the field are points in their favor. They keep a

wound sweet and clean and are not toxic. They will never take the place of boric acid in the eye or of bichlorid in alcohol in an open joint, but they are far superior to any other antiseptic as wound cleansers. For kennel and stable use they are unexcelled, being deodorant and sweetening.

Recently there has been an attempt on the part of several chemists to produce in a powdered form a mixture that will possess all the virtues of the bulky solutions which are hard to transport. I doubt very much if that will be accomplished. Some years ago I made a practice of carrying two separate solutions of rather more concentrated strength, mixing them as I had need for them and diluting them to suit the case in hand. Aside from bulk, freezing is another drawback, but it is not impractical to carry the lime and the soda separately to the place where they are to be used and make the solution for any patient with instructions that it be kept in a warm place. I have used this method when contagious abortion demanded large amounts in winter.

The Dakin solution came as an improvement over the Labarraque's solution to prevent the skin irritation and, in rare cases, the tissue irritation that followed daily irrigations with the latter. Recently a number of other suggestions have been made and each has its value in selected cases. One is that an ounce of glycerin be added to each pint of Labarraque's solution. Another is that two ounces of sugar be used to each pint. Both have value. The sugar solution tends to prevent packs which have been bandaged on for twenty-four hours from adhering too strongly to the denuded or lacerated surfaces.

There is one last improvement that has not yet come into general use, which possesses a virtue all its own and at the same time has all the best points of any of the other improved solutions. It was produced by Dr. Charles Naylor and is made as follows: 100 parts of chlorid of lime in 2,000 parts of water decanted and strained as before and 190 parts of Epsom salts added. This solution seems to anesthetize the inflamed parts and to promote more regular granulation than either of the other formulas. I think that any practitioner will be delighted with the results he can obtain with this solution as it does not harden the skin of the hands as readily and the packs are easily removed when water is applied to them. When it is used to cleanse deep lacerated wounds daily and is followed by some simple healing oil on the packs the results are rapid and pleasing.

I do not believe that the exact amount of chlorin contained in any of these solutions can be taken as an index of its real value in daily practice. To my mind the fact that they remove the detritus without embalming the surrounding tissues means a great deal. Also, no one knows the part played by various elements in the lymph and the plasma. Some day we may find that these salines stimulate the flow of lymph through the injured area and by osmosis not only bring it to the surface but that it also adds to the capillary circulation some element that stimulates the leucocytes to constant activity. This with the removal of the detritus I believe to be the sole cause of their wonderful success. If this be so then age and the loss of a certain amount of germ-destroying power are of very secondary consideration. We all know that the lower grade antiseptics in oil will do more for the lacerated wound of the barb-wire type than will any of the higher antiseptics of the same or more potent power.

Let it not be thought that I rear my head from the distant bushes to fling mud at the laboratory which has in the past so often led us with one hand while it took all our loose change with the other. This is not a testimonial either; for there are a lot of little things about the hypoclorite group that would make one sit up and take notice, all this preamble is simply to call attention to the way the pendulum is swinging. We are going to see within the next five years some decided changes in wound treatment, because we are about to be taught that we irrigate too much, we irritate too much, we pack and pad and sew too much and we cover with bandages and cotton far too much in the majority of cases. The open treatment of wounds is on its way and it is nearly here. How strange it will be to see the medical

world go back not 80 odd years, as they are now doing, but back another 300 on top of that and repeat the days of the acid users when oils were impregnated with turpentine and sulphuric acid and it was forbidden to wash a wound after it had been cleansed of blood or pus. The heavy oils were used and as long as the wound existed it was kept constantly coated with the oil. The vast majority of wounds went without bandaging and did well, especially ax and sword cuts on horses.

I wonder if any other practitioner who lives out in the bushes and has plenty of time to think and take notice will raise his head and note the coming of the old black oils that will probably be titivated to the exact point of irritant efficiency, the old Friars' balsam in some new disguise, and the old sweet pus-destroying ointments with their calendula and mallow, or elder. If it should happen that any savant in the pyogenic world reads this and would like to make a home run with the bases full all he has to do is to come forth and explain why the little old marigold from mother's garden will yield something that eliminates pus and keeps it eliminated although it is not germicidal itself in ointment form according to tests with bacteria.

There is one thing that I forgot to mention about the Labarraque solution of chlorinated lime and soda. Labarraque did not claim that he was the originator—he simply claimed he made the best on the market. According to Dr. H. Pidoux, long since dead in Paris, the use of "alkaline chlorids" in the Army on the Rhine for hospital gangrene was demonstrated by Percy in 1789. Well, we will have to hand it to the old boys, they had very few really good bacteriologists to tell them how long the gentle pus germ could stay under without losing his peace of mind, but they seem to have had a pretty good observer or two out in the wards. It may be that we are much more clever with our treatment of wounds than were the old timers, but the signs seem to show that we are going back to their methods and that is why I say that we are going to see a change. If you don't believe it read the latest reports on the use of sugar as an antiseptic dressing and then look in the Good Book to find out when they started using aloes and honey and myrrh and honey as dressings for wounds. I won't be mean and say camouflaged honey or that the laymen are on the back track but I will say that the pendulum is going to swing and that the veterinarian is going to lean more and more toward simple remedies that he can make and understand thoroughly. The saints be praised, we may even reach that place, where, like Scott's blacksmith, we will have but "Twa simples—calomel and laudanum." If it were not for rubbing too hard on the antiquity of some of our preparations I would give data to prove that chlorids were popular in Bible times. I once read too about a lady named Mrs. Lot who curiously demonstrated that in a doubtful moment one can turn to a chlorid with complete and permanent results.

ADRIAN V. HALL.

Oxford, Pa.

HEMORRHAGIC SEPTICEMIA DIAGNOSED AS CORNSTALK DISEASE

For the past year veterinarians at bacteriological laboratories and in general practice have had considerable to say regarding a disease not always recognized although often encountered, i. e., hemorrhagic septicemia. From the description given in textbooks surely no veterinarian could be blamed for not recognizing the disease as we now know it. Misled by erroneous descriptions it is small wonder that under the guise of cornstalk disease, cerebrospinal meningitis, dysentery, mad itch, etc., it has destroyed its victims by the thousands and escaped detection by the veterinarian.

In the fall of 1915 I was called somewhat out of my usual range of practice to a farm devoted to cattle breeding. I found a six-months' old calf weighing about 450 pounds with a well developed attack of textbook spinal meningitis, a condition too well known to need description. After making an extensive examination I informed the owner that it was a case of spinal meningitis, and was met by the old compound question, "Well what is the cause and what can you do

for it?" I plainly told him that I did not know the cause and that treatment did not prove successful in many cases. He said the disease had been on his farm for several years and had been claiming from four to ten head of calves from four to twelve months old each year. He said I was the fourth veterinarian he had called to the farm at different times to see the calves. All in turn had pronounced it spinal meningitis but none could give the cause or a remedy that would do any good.

In the spring of 1916 I was called to an adjoining farm and found the same disease in a herd of yearlings. I made a post-mortem and sent the result of my findings and the head of a calf to the division of veterinary research at Ames, Iowa. The owner of the calves was certain that it was blackleg and had pilled them for the third time. You can imagine my surprise when in a few days a letter from the research department came telling me that they had made a positive diagnosis of hemorrhagic septicemia. It required some stretch of imagination to make such a diagnosis correspond to the description of this disease in our standard textbooks. Since then I have sent heads from a number of "spinal meningitis" cases to different laboratories and each time got a diagnosis of hemorrhagic septicemia.

In the summer of 1916 I obtained a laboratory diagnosis of this disease in a herd of milch cows. They were an interesting set of patients—there was much coughing, champing of jaws and grinding of teeth, and long strings of frothy saliva coming from the mouth. They would run, bawl, fall down and lay stretched out, and after a time struggle to their feet and pass shreds of mucus and blood stained feces. Folds of the rectal mucosa would protrude and they would run a temperature of 105-108°.

The symptoms indicated generalized infection. Two had died before I was called. Bacterins, intestinal antiseptics, febrifuges and other indicated treatment was given and in a few days all were in a normal condition.

In the fall of 1916 I was called to a farm where the cattle had been running in a cornfield for about three weeks. They had access to hay stacks, timothy, clover and bluegrass pastures and running spring water and salt. About 20 head were put in the barn lot at night, seemingly in perfect health. In the morning four cows and three two-year old steers lay dead in the barn lot. All appeared to have died with little or no struggling. I posted all of them more or less thoroughly and sent specimens of abdominal and thoracic viscera to the state laboratory, and back came the same diagnosis—hemorrhagic septicemia.

There were about a dozen farmers on the scene when I made these postmortems and they all said, "You are wasting your time, Doc, you know it is cornstalk pizen." Previous to that time I had made many postmortem examinations on cattle with so-called "cornstalk disease," but believe me I could never swallow the theory. One fact in connection with these cows stamped itself very firmly in my mind. I firmly believe I could have milked two gallons of milk from each of these cows as they lay dead on the ground. The indication did not point to a total loss of milk secretion as the textbooks are so fond of telling about in their description of this disease. This experience went a long way in convincing me that cornstalk disease and hemorrhagic septicemia are one and the same trouble.

In December, 1917, I was called to a farm to see a herd of cattle that had been running in a corn field and getting plenty of good clover hay and stabled at night. The owner said they had been fat in the fall when turned into the cornfield, but in a few days they became afflicted with diarrhea, and the feces soon became streaked with blood and mucus. They lost flesh rapidly and when I saw them they were a sad sight—nothing left but skin and bones. One was down and past eating. We ended his suffering and I posted the abdominal and thoracic cavities and sent the head to Ames and got another hemorrhagic septicemia diagnosis. I gave the other cattle full doses of bacterins and left a supply of "zinc sulpho carbulata." All recovered and are now doing well.

Postmortem lesions comprised varying sized hemorrhagic areas on the dia-

phragm, heart sac and heart walls. In nearly every case I have found either red, gray or mixed hepatization in the cephalic boles of the lungs. The submaxillary, lymphatic and mesenteric glands are nearly always enlarged and show hemorrhagic areas. The rectal mucosa and bowel show inflammation extending several feet.

In addition to the cases cited I have met many cases in cattle where they quit eating, seem depressed, have a temperature around 105° or not more than 98°, urinate frequently, strain and pass small amounts of bloody feces, and I now believe these are sporadic cases of hemorrhagic septicemia. I find that they recover much sooner and thrive better if given bacterin in connection with medical treatment than when drugs alone are given.

I have spent considerable time and money in these investigations but I feel well repaid, and I believe if veterinarians would hold more postmortems and send material to diagnostic laboratories they would find by comparison with notes that in the past they have made many an error in diagnosis and stood helplessly by while animals died that might have been saved easily if they had only known just what was wrong.

B. F. Ash, V. S.

Centerville, Iowa.

OPPOSES RAW MEAT DIET

I have just finished reading the reply to the query of James and Kennedy, Ottawa, Ont., in the February issue of your highly esteemed journal. I have been hoping for some time that someone would write on this subject (convulsion in dogs), for it is one that has baffled me quite frequently in my practice, as to cause and treatment.

I think, as you say, it is due to the diet, but I cannot agree with your advice in regard to raw meat as I have more than once traced it back to an exclusive diet of raw meat, which I believe in many cases has caused worms or a nervous disorder, causing the convulsions. Upon postmorten examination I have found a few worms, or the history has led me to believe the dogs have had worms or been wormed.

I have brought my own puppies through on vegetables, buttermilk, milk, bread and beef broth. Unless the animal is a grown dog with plenty of outdoor exercise, it has been my experience that meat is too rich a diet for them, either cooked or raw.

Meat is the cause of most of the sicknesses in city dogs, causing ptomaine poisoning, black tongue and other dietary diseases.

O. G. Button, D. V. M.

Tacoma, Wash.

NEW TREATMENT FOR WHITE DIARRHEA IN CHICKS

Perhaps I owe the originality of this treatment to Dr. Steffen, since in his book "Special Veterinary Therapy", he has a chapter on the treatment of infectious enterohepatitis in turkeys with potassium dichromate. Inasmuch as enterohepatitis is a coccidian disease and the majority of white diarrhea cases in chicks are supposed to be coccidian, the two diseases must be somewhat similar in cause and relationship. Therefore, why not the same treatment in anterohepatitis and white diarrhea as in other coccidian diarrhea?

The results obtained in experimenting on over fifty flocks of chicks known to have white diarrhea prove to me that potassium dichromate is as much of a specific against white diarrhea in chicks as it is against blackhead in turkeys. I have used this remedy in the treatment of little chicks that were dying rapidly, where other remedies for white diarrhea had failed, and have stopped the deaths within twenty-four hours. It has never failed in any of the flocks treated thus far.

I put the dichromate up in solution, using three drams of the crystals in half a pint of water and adding a teaspoonful of stramonium to the half pint of solution. The stramonium may not be necessary, but my theory is that it stops the depleting action of the diarrhea until the dichromate gets in its work and thereby saves the lives of more chicks; at least, the percentage of fatalities has been very small after administering this treatment.

I advise giving a teaspoonful of the solution in a quart of drinking water for

chicks a week old and over. Newly hatched chicks get just half this strength. This diarrhea remedy is a winner, is cheaply put up, is easily administered and chicks drink it readily. It brings results and the farmer's wife who employs it in the treatment of her chicks will be your best friend and booster.

Mt. Sterling, Iowa. C. F. NEIS.

ALOES AND ALOIN TWO DISTINCT PRODUCTS

Replying to the query by your Indiana correspondent on page 138 in the March number, he is evidently confused as regards aloes and aloin, especially where he says: "I have three pounds on hand." These are two distinct products. Aloes is quoted anywhere from 26 cents to $1.40 per pound and aloin U. S. P. at 15 cents per ounce.

It is possible that some aloin on the market is mixed with aloes, but your correspondent should have no trouble in obtaining a therapeutically active product if this is marked "U. S. P.," as this is a legal standard which must be lived up to if so indicated on the label. The fact is that while Barbados aloes is the best to be had, there is a decreasing quantity available, eventually we assume it will be entirely off the market.

I would suggest to your correspondent that he specify U. S. P. quality, which should meet his requirements.

Chicago, Ill. FRANK B. KIRBY.

MERILLAT HELPED HIM IN A LAWSUIT

I had a little case in the courts the other day that may be of interest.

I treated a case of fistula for a client, and for a time the horse seemed to be doing well, but took a sudden turn for the worse and died from secondary infection. My client claimed that I killed the horse by using too strong medicine.

My bill was $20; he offered to pay me $10. I sued him and won the suit. By the time the farmer got through it cost him $40.00. I paid my attorney $5.00 which left me $15.00, $5.00 more than I was offered in settlement, besides the satisfaction of having won the case.

I want to say that Major Merrillat's little work on "Fistula and Poll-Evil" is just the thing for a case of this kind. Merillat is accepted as authority by everyone on this subject, and he plainly states that death from fistula is by no means a rare thing, and is often unpreventable. This was a "clincher" for me.

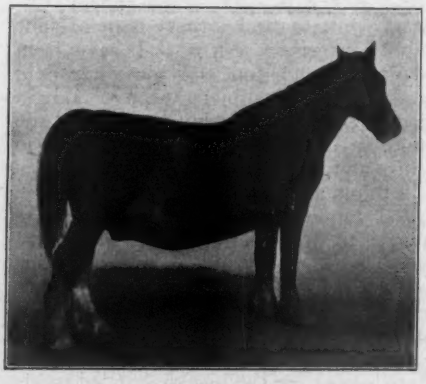
J. M. R.

INTESTINAL CALCULUS IN HORSE

For two months the horse had been acting rather dull, and on December 1st, he had a slight attack of colic and was allowed to rest for three days. No doctor was called and the horse continued to work until January 9, when he refused to eat and had several attacks of colicky pains. A doctor was called January 10, and he diagnosed the trouble as bowel stasis.

Cathartics, opiates and heart tonics were given for several days with no effect and, surmising there might be a foreign substance in the intestines, the veterinarian made a rectal examination, but found nothing. The pain ceased and the horse was able to eat again. There was no movement until February 1, when the animal began to suffer great pain and died that evening. Postmortem examination disclosed a calculus in the colon, weighing 7.5 pounds, measuring 22 inches. The horse was 12 years old, weighed 1,500 pounds, was in good flesh and had never been sick a day in seven years.

Cuyahoga, O. W. A. BISBEE.



Ventral hernia due to the detachment of prepubian tendon, which took place twenty-eight days before time to foal.—D. C. Grinnell, Clifton, Ill.

Queries and Answers

HOW TO PROVE THAT HOGS HAD CHOLERA

I would like to know what evidence a veterinarian would need in order to swear that a certain lot of hogs had hog cholera, and prove the same to a jury.

Upon postmortem examination I found no petechiæ in the kidneys which seems to the only sure lesion of cholera. Could a person say the other lesions found resembled those of hog cholera, and let the jury take it for what it was worth? I have kept no record of the lesions found.

Some three and one-half months ago, I autopsied a pig, to determine whether the owner should vaccinate. He vaccinated. Three months later he shut his neighbor's hogs up in his lots and they became sick, and the neighbor is suing for damages. Information as to how to give a proof of the presence of hog cholera will be appreciated.

Iowa. G. G. H.

REPLY: This appears to be a question to be decided by expert testimony. Expert testimony has to do with opinions rather than facts.

You would be asked to tell the facts as to lesions disclosed by your investigation of the case, and your opinions as to what such lesions indicated. The owner would also be called upon to state the facts as to the course and symptoms of the ailment prior to calling you; then you would be required to give an opinion as to the meaning of the course and symptoms.

The other side has a right to challenge your qualifications as an expert on diseases of hogs, and to prove, if they can, that your opinion is not entitled to weight.

Many men who have had large experience with hog cholera would hesitate to make a definite and positive diagnosis from a postmortem examination of a single hog. In this case we should be inclined to give the history, course and symptoms of the disease more weight than the lesions. Petechiæ in the kidneys are not always present in hog cholera, and of course they are present in a number of ailments that are not cholera; in fact, acute hog cholera may be an almost lesionless disease. Some serum companies will use virus only from animals that show practically no lesions on postmortem examination. Hemorrhagic lymph glands, bone-marrow and intestinal mucosa, and foci of inflammation in the lungs are accounted just as many evidences of complication by some, though of course such lesions are given weight in arriving at a diagnosis, since they are commonly found as complications of cholera.

It would not be necessary for you to have on record a written record of your autopsy, in order to be able to give testimony as to what you found, and as to your opinions of the ailment as based on these findings, provided your recollection of the matter is clear. However, the common failure to keep at least some written record of autopsies is to be deplored. It would no doubt have its weight with the jury as indicating to some extent a lack of care and systematic methods on your part. This lack of care would be further emphasized by the failure to make a bacteriologic examination.

The plaintiff has to prove not only that cholera infection previously existed on his neighbor's premises, and that his own hogs died of cholera, but a strong probability that they contracted the disease while incarcerated by his neighbor and not from the multitude of other sources from which hog cholera may be acquired by susceptible hogs. Other possible sources must be eliminated.

The defense may claim contributory negligence on the part of the plaintiff in that he had not used the protective serum. If it can also be shown that the plaintiff had reason for believing the premises

infected before sending the hogs to defendant's field this failure to use serum should be fatal to the case. But if defendant seized the hogs and shut them in *without consent* of owner this plea of contributory negligence would be without value.

And, finally, do not go onto the witness stand without having read and re-read every word that Hemenway says about expert testimony. Veterinarians too often leave the witness stand feeling exceedingly small because of blunders they have made that might easily have been avoided had they possessed just a little information as to their rights and responsibilities as expert witnesses.

It goes without saying that no cautious veterinarian will offer testimony in a case such as this without thoroughly familiarizing himself with the statements of authorities on the diseases of swine, and the meaning of different lesions and the symptoms of various diseases.

SHEEP DIE FROM FORAGE POISONING

I was called to see a flock of sheep, two of which had died previous to my first visit. They had been dead several days, but I held a postmortem examination on one of them, but could not determine the cause of death.

Symptoms: The owner noticed one of them standing with head raised or slightly thrown back. Then in a couple of days they became perfectly blind in both eyes, but were still up and able to get around. They got stupid and finally laid down and died. They breathe a little faster than normal, but have little if any rise in temperature.

These sheep have been running in corn stalk fields and had access to a large oat straw stack with timothy hay in the feed racks. This trouble has been recurring every spring about February or March for four years, on different pastures and feeds. Is it a food poisoning or what?

REPLY by DR. E. T. BAKER: Your query referred to me for reply, and while we are all aware of the value of "absent treatment," still suggestions sometimes are helpful.

My opinion is that you have a form of forage poisoning. From now on till lambing time dozens of letters will come rolling in to me giving different versions of this trouble.

I suggest three things, and if the owner does not want to carry them out, he can carry out the dead. They are: At least one mile of exercise a day; a half pound of whole oats and bran, each, at least once daily; plenty of salt to which some charcoal is added.

If the owner objects to this and prefers to feed moldy feed or straw, when wool is around six bits a pound, and a common ewe worth $20, that is his lookout. I find sheepmen are the hardest clients to deal with, and now I tell them what to do and cease talking. They usually come again for more advice. No use coaxing them; they will learn.

LIABILITY FOR NEGLECT IN MAKING AN EXAMINATION

I was called to treat a cow that had been found in this condition, how long is not known: head extended, temperature 102.4° F., ropy saliva running from mouth, no soreness or swelling present. Diagnosis: Pharyngolaryngitis. The farmer said all his neighbor's cattle were in the same condition. I gave medicine for laryngitis and the patient seemed to swallow, but would cough after the first two or three doses. I failed to look into the mouth as I thought I would not be able to see anything. The cow died. The farmer cut into the throat and found an ear of corn and some inflammation present. The cow was valued at $75. He wants me to pay for it. Can he hold me and for how much?

REPLY: There is a strong possibility that if this case comes to trial you may be held liable for the full value of the cow.

Of course circumstances would govern the conditions, but in some respects you failed to do your part and that failure would probably render you liable.

Every physician and veterinarian is himself the sole judge of the number of calls he should make in a given case, and it is his duty to make as many calls as are necessary. He is absolutely responsible for untoward results that may come from

his failure to make necessary calls; this, of course, provided there is no agreement with the owner to relinquish the case. Assuming that at the time of your first call you exercised reasonable care and skill in your examination, and that your judgement as to the ailment was a reasonable one, all of which is open to question, you would probably still be held for neglect in not following up the case until the patient recovered or died, or until you were relieved of the case with the consent of the owner.

Assuming that you looked for an early recovery without further treatment, it was your duty to so inform the owner and instruct him that if the case did not progress as you expected it to, he should notify you, and upon such notification you should, of course have visited the case again. You may be able to show contributory negligence of the owner in that he did not again call you when the case was not improving.

The plaintiff can probably introduce testimony to show that such cases are not hopeless, but that with proper treatment they often recover. He can probably introduce testimony to show that the history and symptoms presented would ordinarily lead a careful and skillful veterinarian to make a more thorough examination than you made; in short, that the animal probably died from lack of skillful treatment, and the lack of skill on your part was probably due to carelessness and neglect rather than to incompetence; and in the hands of a jury carelessness and neglect usually fare worse than incompetence where the intentions are good, and one has done the best he knows.

In view of the expense to which your client will be put by resorting to litigation for settlement, he will probably be satisfied to compromise and settle the case and for less than the value of the cow when sound. It would appear an act of wisdom on your part, and of justice as well, to satisfy him. Even if he failed to secure a verdict the trial of the case is liable to do you more harm than could be well estimated. Therefore it is far better for you to settle as best you can out of court.

"SOFT CORN" POISONING

From October 15 to February 1, I have had 35 cases of soft-corn poisoning, or so-called meningitis. The corn may have prematured. It looks clear, but shows an immature condition.

The animals afflicted show a very nervous condition. High-tempered animals exhibit more nervous excitement, and die sooner than stolid ones. Only 12 of the 35 cases recovered, under a treatment in the early stages of cathartics and nerve sedatives.

In some cases I have used a stimulant when the temperature ran down to subnormal, but the result was not satisfactory. The mortality has been greater with this disease than with any other I have come in contact with during the seventeen years of my practice.

I have made several postmortem examinations of the brain and spine, and found them in a highly congested state.

There was more of this trouble in December and January during the extremely cold weather. When the cattle were standing and getting no exercise the disease seemed to work more havoc than at any other time. On postmortem the brain is seen to be of a very dark gray color, and many splotches indicate inflammation from congestion.

I would be pleased to hear from some one who has a better treatment to suggest than I have prescribed. It is a very difficult matter to make the farmers about here believe that the corn they are feeding this year is not as good as they have had heretofore. It looks good enough but shows a soft premature state. It was planted late, especially on bottom lands. The majority of the cattle have been eating it since December.

W. A. H., Ala.

REPLY: I cannot suggest a better treatment for the type of forage poisoning which you describe as being due to feeding immature corn, than active cathartics given as early as the condition can be diagnosed. Where the animals are violent and exhibit extreme excitement and nervousness, copious bleeding from the jugular vein acts more agreeably than nerve sedatives.

Stimulants, I believe, are always contraindicated in these cases, until near the

end, when, of course no treatment is of any value.

It has been reported that a line of medication designed to keep the bowels open and freely active all of the time will prevent the onset of this type of forage poisoning. For this condition, powder is prescribed, to be given in the feed, in a quantity sufficient to give the animal from one to two ounces of Epsom or Glauber's salts, together with ginger and gentian and perhaps fenugreek to conceal the taste.

FAKING WITH "PHENOL SERUM" ENTAILS DISASTER

I was much interested in the article "The Veterinarian and the Law." We have a case in this country, the history of which is as follows:

A man had abortion disease in his herd and had lost some calves. A veterinarian vaccinated them with a "phenol antitoxin" that he made, using a one per cent solution and injecting 5 mil in each of 18 young cattle. On the older cattle he used a commercial bacterin. Twenty-four to seventy hours after the injection of the "phenol antitoxin," eight of the young cattle died with symptoms of local septicemia. At the point of injection there was extensive swelling and blood oozed through the skin.

Specimens were sent to two laboratories for diagnosis: One reported hemorrhagic septicemia, and the other reported negative findings. Both made animal inoculations, but failed to produce the disease. Seven or eight days after the eight cattle died, three more died that had not been treated but had trampled over the dead ones.

If the veterinarian is worth it, would he be liable under the circumstances?

M. M. C.

REPLY: There seems to be no question but that the practitioner is liable in this case for the value of the eight animals that died first, obviously from the effects of the hypodermic injection. He probably can not be held for the value of the other three, lost through the failure on the part of the owner or his veterinary advisor to use ordinary precautions in keeping the well animals from the carcasses of the dead ones.

In case the same veterinarian continued in charge of the case, and permitted this association of the well animals with the dead, there is reasonable probability that he may be held responsible for the loss of the three animals which died a week later; or if another veterinarian was called in the case after the first disaster, and permitted this without protest he might be held responsible for the loss of the second group of animals that died.

It is regrettable that a careful autopsy was not made on the animals that died to discover the cause of the deaths, and that a laboratory examination was not made from material for examination obtained by someone thoroughly familiar with methods for taking samples of blood and tissue for laboratory examination. However desirable a diagnosis in this case would have been, it appears that it is unnecessary to fix the responsibility for the deaths of the animals.

Whether they died from hemorrhagic septicemia, malignant edema, streptococcic infection of unusual virulence, or whatever it may have been, the fact that the deaths resulted from carelessness in making the injections seems conclusive. That being the case, it would establish the fact that the veterinarian did not use reasonable care or employ reasonable skill in making the injection, and there is no way in which he may escape the responsibility for the untoward results through his failure to exercise reasonable care and reasonable skill.

The further fact that the veterinarian was plainly faking when he made these injections, and was attempting to fraudulently obtain money from his client without giving him any value in return, would influence the court in the plaintiff's favor, as it properly should do.

In this case, the defendant could not offer the defense, if it be considered a defense, that he was honestly trying to protect his client's animals. It is doubtful if the statement that he thought an injection of one per cent carbolic acid might prove protective against contagious abortion would be credited by the court. In any case it would not be credited in this case, where it could be shown that in the older cattle, those

where abortion was imminent, a recognized bacterin treatment was used, while in the younger animals, presumably not pregnant, the practitioner shrewdly decided to rely on the efficacy of a discredited quack remedy, obviously because it was a less expensive treatment. The case is plainly one of malpractice, a violation of ethics and dishonesty.

It would appear that justice would be furthered, the public interests would be served and the live stock industry of the locality protected by hanging a judgment over this practitioner's head that might serve as an admonition to tread in the paths of rectitude for years to come.

The protection of the good name and interests of the veterinary profession in the locality demands that, if the facts are as stated, the practitioner's license be revoked and that he be ejected from membership in any veterinary association to which he may belong.

WHICH IS BEST OPERATING TABLE?

I would like to hear from different veterinarians as to what they recommend in an operating table. Which kind is best, most practical and convenient for all operations?

Would also like some suggestions in building stocks.

F. C. MECKSTROTH.

St. Marys, Ohio.

INFORMATION WANTED

How much traction would it be wise to apply to the spermatic cord in pulling down the testicle in poorly developed, short-corded yearlings?—J. O. B., S. D.

WHAT A $100 BOND WILL DO

Clothe a soldier.
Feed a soldier for eight months.
Provide five rifles.
Provide thirty rifle grenades.
Provide forty-three hand grenades.
Provide twenty-five pounds of ether.
Buy 145 hot water bags.
Buy 2,000 surgical needles.

BRITISH ARMY VETERINARY SERVICE

(*Continued from page* 234)

national welfare. Naturally all this mallein testing means a great deal of anxious work and drudgery. There are few duties of which the army veterinary surgeon becomes so heartily sick as this incessant testing of horses with mallein. Nevertheless it has to be done and results show that for the most part it is done skilfully and thoroughly.

Formerly all mallein used by the British army was obtained from the Royal Veterinary College Laboratories in London, but early in the war it was decided that the Army Veterinary Corps should undertake the preparation of the mallein required and that the laboratory of the army veterinary school at Aldershot should be used for this purpose. Accordingly an officer of the special reserve of the Army Veterinary Corps, a trained bacteriologist, was appointed to carry out the work and matters proceeded satisfactorily till at the height of its activity the laboratory was turning out 80,000 doses of mallein a month. This could have been maintained but an interesting development in the history of mallein lessened the need for the variety of mallein hitherto in use. This development occurred as the result of research by French veterinary surgeons who discovered that a very much smaller quantity of a differently prepared mallein injected into the skin of the eye-lid sufficed to give a more delicate and, in the opinion of many operators, a more certain test for glanders. For some time the new mallein was all obtained from French sources, but recently the laboratory of the Army Veterinary School has to prepare it and no difficulty is anticipated in turning out an equally reliable preparation of identical nature.

During the last two years only two cases have occurred in which a cast army horse or mule has been found to be affected with glanders after transfer by sale to the civilian community, notwithstanding the large numbers of army animals that have been so disposed of during this period. Perhaps this fact constitutes the best evidence that could be

offered of the efficiency of the mallein test and the way in which glanders among army animals has been controlled by this and other means.

Horse Ambulance of Great Assistance

The application of horse ambulances to military purposes has been an interesting and useful feature of the present war. During peace horse ambulances have for some time past been used by the Army Veterinary Corps in connection with station veterinary hospitals, but it is believed that the present war is the first in which they have been taken into the field.

Two chief kinds of horse ambulances are used at present, motor horse ambulances and horse-drawn vehicles. The motor horse ambulance was first used overseas at a busy port where the veterinary hospital was necessarily located on a height some distance from the quay. When dealing with animals sick or accidentally injured on the voyage, it was found that some rapid and powerful means of transport was desirable to convey the patients with the least possible delay from the ships to the veterinary hospital.

Apart from the humanitarian aspect these motor ambulances play an important economic part in facilitating the removal to veterinary hospitals of numbers of horses and mules that would otherwise have to be destroyed. Injuries to the foot bulk largely in the list of troubles to which the war horse is particularly subject. Of this class of injury the principal cause is the extraordinary liability of iron nails lying on the ground penetrating the sole and frog of the horse's foot. Most of the material conveyed to the troops overseas is packed in light wooden cases and in the process of opening and ultimately burning these, nails become distributed broadcast. Every possible effort has been made to prevent this distribution, but military exigencies are such that this result is to a large extent inevitable.

The cases of picked-up nail, that is cases of injury to the foot of army horses from this cause, in France alone, number several hundred a week. Attempts are being made to devise a movable metal protection to the sole of the foot that will prevent penetration by nails without being too heavy or difficult to adjust, and it is hoped that in due course a satisfactory outcome of the experience will result. In the meantime the horse ambulance probably justifies its provision and maintenance on account of this item alone.

Army horses working on modern macadamized roads have to be shod well and frequently if they are to remain effective and on duty. A set of shoes will often barely suffice a horse in a gun-team for 100 miles of modern road work, i. e., about five days' constant but not severe traveling.

UTERINE INERTIA IN THE BITCH

This condition is one of the most common and at the same time the most vexatious with which the practitioner has to deal. It is most commonly found in highly bred, overly fat, pampered, or debilitated bitches. The uterine contractions become weak or entirely suspended after the birth of one or two puppies, sometimes even before the first one is delivered. It is the cause of great mortality, as the unborn puppies quickly die and decompose. The bitch must be given stimulants—brandy or whisky orally and ergotin hypodermically, or fluid extract of ergot orally every thirty minutes until the contractions begin again.

If ergot fails, large doses of quinin sulphate combined with intra-uterine injections of warm sterilized glycerin will often have the desired effect. One to four drams of pituitrin, repeated in one hour if necessary, is a remedy for this condition that gives much promise, but its usefulness is not yet positively decided. In any event, treatment must be persistent and continuous until the contractions are re-established. It is not only useless but bad practice to fish around with the forceps and try to remove the fetus by force unless it is well into the vagina. Such procedure only leads to lacerations or even perforations of the uterus.—C. G. Saunders, in "Canine Medicine and Surgery."